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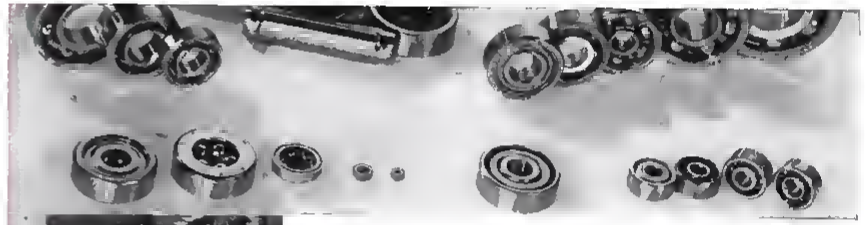

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NEWS DIGEST

Domestic

Airport Industries, Inc., N. Y., has taken options on 14 acres of MacArthur Airport, L. I., N. Y., for development of an air cargo terminal. The firm has also acquired a 139-acre site adjoining the field which is to be made into a light industry center. Plans are to integrate the two activities.

Boost in jet fuel output has been urged by Petroleum Administration for Defense. PAD has told refineries that 500,000 barrels of jet fuel above this month's quota may be needed in August.

Roger O. Lindsay, 57, a Civil Aeronautics Administration official based at Ft. Worth, Tex., died Aug. 2 following surgery. Credited with six enemy planes in World War I, Lindsay also served in the AAF during World War II.

Will Rogers Skyway is the name given to the private pilots' airway spanning the country from New York to Los Angeles. The skyway is studded with ground markers.

New York Airways, certificated scheduled helicopter service, has submitted a proposal to the P. O. Department for construction of heliport facilities on the roof of the main Post Office building at 34th St. and Eighth Ave., N. Y. C. The carrier plans initially to fly mail and parcel post between LaGuardia, Idlewild and Newark Airports, using S-55 copters scheduled for delivery this fall.

Maj. Gen. Warren R. Carter has been named commander of Allied Air Forces in Northern Europe, succeeding Maj. Gen. Robert K. Taylor, who becomes chief of staff to Gen. Thomas T. Handy, Deputy U. S. Commander in Chief, Europe. Carter will be under command of British Adm. Sir Patrick Brind, RN.

Globe KD6G-2 target drone, powered by Kiekhofer four cylinder inverted engine, is undergoing tests at Kingman, Ariz., prior to production this fall. The KD6G-2 is believed to be the fastest target drone powered by a piston engine.

Twin-Navion conversion service is being handled by Riley Aircraft Mfg. division, Ft. Lauderdale, Fla. Custom conversions from single-engine Ryan or North American built Navions to twin Lycoming configuration are quoted from $18,000-$20,000. The Lycoming engines are rated at 140 hp. each.

PIASECKI H-25 for U. S. Army carries tail insignia aptly depicting its mission, that of hauling supplies and troops to the front and evacuating wounded to the rear. First of a substantial number of H-25s—which are the Army version of the Navy HUP-3—is scheduled to be delivered next month. The craft carries four-six plus two crew.

Private pilot applicants may now get their certificates directly from local CAA safety agents. Previously the licenses were issued from Washington following grading there of applicants' examination papers.

Fred Henry, 53, publisher of Skyways magazine since its founding in 1942, died Aug. 7.

Bob Faris flew single place Mooney Mite lightplane 1,400 mi. nonstop from Wichita, Kans., to Montpelier, Vt., on Aug. 9 in a fraction less than 12 hr. He stated he used approximately 30 gal. of fuel. A French pilot holds the official record for midget plane distance flights, 1,135 mi., set last August. The Mite weighed 1,072 lb. on takeoff.

Financial

Lear, Inc., Grand Rapids, Mich., reports net income of $426,000 for the first six months of 1952, with shipments for the period being $17,903,000. As of June 30, Lear's backlog stood at an all-time high of $61,433,000, 56% being government prime contracts.

Delta Air Lines reports $1,650,450 net profit after taxes for the fiscal year ending June 30, with total operating revenues showing a 22% increase over the same period the previous year.

Fairchild Engine & Airplane Corp., Hagerstown, Md., has declared a 30 cent per share dividend payable Sept. 17 to holders of record Aug. 19.

International

Air-to-air missiles are contemplated for the Avro Canada CF-100 all weather jet fighter.

Two DH Avon-Comets have been ordered by Linea Aeropostal Venezolana for use on the Caracas-New York route. The planes are slated for delivery in 1955. DH now has 49 firm and tentative Comet orders.

Gloster G.A. 5 delta-wing, twin-jet all weather fighter has been named the Javelin.

Canada's Dept. of Defense Production placed aircraft parts and spares orders totaling $114,400 during the last half of June.

Pan American-Grace Airways has been awarded National Safety Council's Aviation Safety Award for flying 884-262,000 passenger miles without accident in the past eight years.

German rocket research group has been experimenting near Bremen. Recent tests were deemed "unsatisfactory" because of "poor stability" of the missiles.

Japan Air Lines, which has ordered two Avon-Comets for delivery in 1955, plans to begin service to London that year, with stops at Hong Kong, Bangkok, Calcutta, Bombay, Karachi, Cairo and Rome.

Air France is seeking to fly a fortnightly service from Paris to Bogota, Colombia.

AVIATION CALENDAR

Aug 19-30—National Soaring Contest, Grand Prairie, Tex

Aug 26-29—IRE Western Electronic Show & Convention, Municipal Auditorium, Long Beach, Calif

Aug 27-30—National Flying Farmers convention, Alabama Polytechnic Institute, Auburn, Ala

Aug 30-Sept. 1—International Aviation Exposition, sponsored by Aero Club of Michigan, including Continental Motors Trophy Race, Wayne Major Airport Detroit

Sept 1-7—Society of British Aircraft Constructors annual display, Farnborough England

Sept. 4—Centennial of Engineering banquet, Hotel Knickerbocker, Chicago

Sept. 4-5—Eighth National Conference on Industrial Hydraulics Sherman Hotel, Chicago

Sept. 5-7—Preconference instrument maintenance clinic, Instrument Society of America national instrument conference Case Institute of Technology, Cleveland Send advance registrations to P V Jones, Instrument Society of America, Pittsburgh 33

Sept. 8-12—Instrument Society of America seventh national instrument conference and exhibit, Cleveland

Sept 14-23—Aeronautical Fair, Forlanini Airport, Milan, Italy

Sept 15-19—International Air Transport Assn, eighth annual general meeting Geneva Switzerland

Sept 26-28—Aero Medical Assn interim meeting Paris, France

Sept. 29-Oct 1—National Electronics Conference, Sherman Hotel, Chicago

Sept. 30-Oct. 2—Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co, Toledo

Oct. 1-4—Society of Automotive Engineers national aeronautic meeting, aircraft engineering display and aircraft production forum, Hotel Statler, Los Angeles

Oct 9-10—Airport management operations conference, Oklahoma University, Norman, Okla

Oct 11-18—Fourth annual All-Texas Air Tour, information available from Texas Aeronautics Commission, Austin

Oct. 25-Nov. 2—International aviation and travel exposition, Navy Pier, Chicago

Oct. 28-29—Transport Aircraft Hydraulics System Conference sponsored by Vickers, Inc, Hotel Park Sheraton, Detroit

Nov 6-7—National fuels and lubricants meeting, Society of Automotive Engineers The Mayo, Tulsa, Okla.

Dec 2—Symposium on light metal heavy-forgings and extrusions for modern aircraft, Society of Automotive Engineers, Hotel Statler, N. Y

PICTURE CREDITS

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Washington Roundup

Battle of the Budget

Military programs for the fiscal year 1954 now being drawn up separately by the three services, are likely to touch off the bitterest inter-service row since the B-36 investigation in 1949

Skirmishes will start early in September when the service programs backed by budget estimates go to the Secretary of Defense Fighting over where cuts are to be applied will involve major policy decisions as to the emphasis to be put on various aspects of defense and will increase in intensity

Programs approved by the Defense Secretary are scheduled to go to the Bureau of the Budget early in November for another go-around

At this point it is expected that the successful presidential candidate's choice for Defense Secretary will either take over that post from Secretary Robert Lovett or step in as Deputy Secretary the position now held by William Foster

Lovett is expected to resign, opening the way for either the choice of the new administration, or Foster, to serve as secretary the last two months of the year

The compelling reason for the change is that next year's secretary should become familiar with the military programs at budget sessions in November and December so he can defend them before members of Congress in January

The 1954 defense budget will be close to this year's $46 billion, according to Lovett This was divided as follows Army, $12 billion, Navy, $13 billion, Air Force, $20.5 billion, with the remainder for overall department operations

The sharpest battle over the way next year's funds are to be sliced probably will be between Naval Aviation, and USAF:

- USAF considers last year's decision for a 143-wing force by mid-1955 final and "closed,"
- Navy, though, thinks the 143-wing USAF program, along with other aspects of the defense program, should be reconsidered
- USAF can be counted on to put up determined opposition to a third 60,000-ton flush-deck carrier, scheduled to be powered with an atomic engine Navy will ask for two more carriers, but put up a last-ditch battle for at least one more

Collective Security

In the Pacific

U S's increasing role in Pacific security means more emphasis on Naval power

And, appointment of Adm Arthur Radford, Commander in Chief, Pacific Fleet, as U S representative on the three-power (Australia, New Zealand) Joint Chiefs of Staff means that whatever program for Pacific security is worked out will be aggressively pushed

In Europe

A basic revision of NATO's rearmament program, shifting emphasis from ground forces to air power to cut cost, is due for consideration within the next few months

The present program is geared to the standard ratio of one air group or wing for each Army division It calls for 50 divisions and 4,000 aircraft by the end of this year

Inability of Great Britain and France to meet the cost of the present program has added pressure for the reconsideration

Unification or Disunification?

Secretary of Defense will be armed with legal power to exercise absolute authority over the procurement and production programs of all of the three services, starting Sept 8

The provision, giving the secretary complete control over all aspects of procurement and production, was tacked onto the 1953 fiscal year military budget, to become effective 60 days after the July 8 enactment of the act

The objective of the provision is to promote unification

But there is substantial congressional support for moving in the opposite direction Members of House Armed Services Committee feel that the Joint Chiefs of Staff and other coordinating committees, panels, and boards that have sprung up under unification, are little more than debating societies. They feel the defense program would be able to proceed more smoothly without them

A showdown on defense organization early in the new Congress is likely

Politics

Former Air Force Secretary Stuart Symington, who won a smashing victory over his Truman-supported opponent in the Missouri Democratic senatorial primary, is given heavy odds to defeat Sen James Kem, seeking his second term, in November

Rep. Albert Gore, who led the successful House drive to block use of Air Force funds to Aro, Inc, for operation of Arnold Engineering Development Center, seems certain for elevation to the Senate next year He defeated powerful Sen Kenneth McKellar in the Tennessee Democratic senatorial primary

Air transport industry will have new faces to deal with on Senate Interstate and Foreign Commerce which will consider air mail subsidy separation legislation again next year

- Death of Sen. Brien McMahon and decision of Sen Herbert O'Conor not to seek re-election will advance Sen Lyndon Johnson to fourth rank on the Democratic side
- Defeat of Sen Owen Brewster elevates Sen. Homer Capehart to second spot on the Republican side, outranked only by Sen Charles Tobey

McMahon and Brewster lead the Senate fight for the scheduled airline position on subsidy separation legislation this year

- All three of the Republicans, in addition to Tobey and Capehart, are up for re-election Ohio's Sen John Bricker, Delaware's Sen John Williams, uncompromising opponent of airline subsidies, and Sen James Kem

Rep Percy Priest will move up to second spot on the Democratic side of House Interstate and Foreign Commerce next year and probably head its Aviation Subcommittee This results from Rep Landley Beckworth bypassing re-election to the House in favor of seeking a Senate seat—for which he was defeated in the Democratic primary by Texas Gov Allan Shivers

—Katherine Johnsen

WHO'S WHERE

In the Front Office

John L. Weller has been named a vice president of Trans World Airlines. He joined the carrier in 1945 as assistant to the vice president, coming to TWA from the Navy where he served with BuShips.

Allan A. Barrie, manager of Transocean Air Lines' Atlantic-European division for the past three years, has been made vice president of TAL's subsidiary Aircraft Engineering & Maintenance Co., Oakland, Calif.

Robert B. Chapman, III has been appointed director, vice president and assistant general manager for Aircraft Armaments, Inc., Baltimore, Md. He joined the firm in 1950, formerly was with Glenn L. Martin Co. in special weapons sales.

What They're Doing

Brig. Gen. John P. Henebry has been released from a two year tour of active USAF duty and has returned to the presidency of Skymotive, Inc., Chicago aircraft maintenance and sales and service firm. Prior to his release from service Henebry was awarded the Distinguished Service Medal for achievements in Korean service where he commanded the 315th Air Division Combat Cargo.

Bruce F. Grumm, Jr., formerly of Hycon Mfg. Co., Pasadena, Calif., **Clyde Amslee** and **John E. Lochridge** have formed Calectronics, to make precision potentiometers.

Colin H. McIntosh, who recently resigned as vice president-operations with All American Airways, Inc., has opened an office at 1417 K St., N.W., Washington, D. C., as an transport consultant.

Changes

W. E. Benoit has been named manager of Westinghouse Electric Corp.'s Electronics division, Baltimore, Md., and **Rear Adm. Martin P. Hottel** (ret.), has been appointed manager of the firm's Air Arm division at Baltimore.

A. P. Higgins, Convair Ft. Worth development manager, transferred to San Diego where he has been made executive assistant to the division manager. **V. J. Dolson** takes over Higgins' duties in Ft. Worth.

Roy Backman has been named sales manager-products for Pacific Airmotive Corp., Burbank, Calif.; and **George T. Keller** has been made sales manager-maintenance. New PAC purchasing agent in the manufacturing division is **Richard M. Robinson**.

W. V. Warner has been placed in charge of a new Dayton, Ohio office set up by Ford Instrument Co., division of Sperry Corp., N. Y., for liaison with USAF.

Charles G. Sims has been designated division manager in charge of small motor switch sales for Cutler-Hammer, Inc., Milwaukee, Wisc.

Dr. Ralph J. Lilpelmd has joined the combustion section of the Missile Development division of National Bureau of Standards.

INDUSTRY OBSERVER

► Chance Vought F7U-3 Cutlass, preparing for carrier qualification tests, skidded off the end of a wet runway when landing at Patuxent Naval Air Station, but sustained relatively minor damages. It is being repaired to start its deck landing trials shortly. The airplane is powered with two Allison J35-A-29 engines with afterburners in place of the delayed Westinghouse J46 engines originally scheduled for the production Cutlass. It has been flying with this powerplant arrangement since last December.

► **Kaman Aircraft Corp. is working on development of a "Rotor-Chute," which operates on a rotating wing principle like a helicopter. It is presumably a successor to the General Electric Rotachute and the German Focke-Achgelis FA 330 Rotor-Kite for submarine tow, two World War II developments.**

► Watch for a trend to integral fuel tanks and away from fuel cells for high speed jet aircraft. The point is that the rubber and plastic fuel cells themselves occupy some space, engineers, greedy for every cubic inch of fuel space they can get, would prefer to fill this with fuel. You can get considerably more gallons of fuel into a sealed up wing than you can get into the same space if part of it is taken up with walls of a fuel cell. And until specific fuel consumption of the jets goes down much farther, this will remain an important design consideration.

► **Boeing B-47 wings deflect approximately 16 in. down when on the ground and approximately 45 in. up when in flight at the 185,000 lb gross weight condition. In static tests the B-47's wing aero-elasticity has been tested much further through a 20 ft. wingtip area without serious wing damage.**

► Although the development lag of the Westinghouse J40 turbojet (rated at 7,500 lb. thrust dry and 10,000 lb. with afterburner) has become a major problem for manufacturers of Naval aircraft designed around the engine, a similar lag in the appearance of the Westinghouse J46 has retarded development of the Douglas F3D and the Vought F7U-3. The J46 is a much smaller engine than the J40 but was counted on in twin installations to boost performance of the earlier J34-powered Skyknight and Cutlass models to where they would be extremely attractive for Naval carrier use. Westinghouse failure to produce the J46 has been a major factor in abandonment of production plans for the advanced version of F3D, and Vought is building its initial increment of F7U-3s with Allison J35 engines.

► **U. S. aircraft industry has been invited to submit its recommendations to the military services in regard to JP-5, a new jet fuel specification proposed for Navy carrier aircraft.**

► Seattle observers say that the Boeing YB-52's four double pods, which carry eight Pratt & Whitney J57 turbojets slung under the wings, appear to be raked forward more sharply than is shown in photographs of the airplane. In event of engine trouble, this arrangement could mean that there would be less chance of damage to the wing, either from fire or from flying turbine parts. It could also be a part of the airplane's "stretch" planning to make room for extending afterburners behind present tailpipes.

► Both the Air Force and Navy are interested in a turboprop-powered sweptwing version of the Republic F-84. The plane would be powered by an Allison T40 with twin power sections coupled to a pair of Aeroproducts supersonic three-bladed propellers.

► TWA and Eastern pilots are fighting the 1,250 lb. weight increase allowed on the Martin 4-0-4 by CAA's recent recertification of the plane under the new Part 4B of the Civil Air Regulations. The old en route climb requirement limited the 4-0-4 to 43,650 lb. The new one allows a 44,900 lb. gross for the 4-0-4, as CAA interprets the regulation.

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UNDER WRAPS, the massive XB 52 was rolled out last November at night. Lowering tail was folded (arrow) to clear hangar ceiling

Veil Lifted on Boeing B-52 Details

Last December AVIATION WEEK *began an experiment in voluntary censorship of news of the Boeing B 52 bomber. The plan was to hold up publication of any data not cleared by the Department of Defense. The following story, cleared by the Department of Defense, is the first detailed report on the B 52 testing program and what it means. An* AVIATION WEEK *reporter went to Seattle under an Air Force clearance to do a story on the two B 52s now exposed to public view on Boeing Field. He was subject to the restriction that he was not to get inside the airplane, but could write about what he saw. This is what he saw.*

By Alexander McSurely

Seattle—About twice a week you can hear them, any place within a five-mile radius of Boeing Field—a double quartet of high-decibel snarls that buffet the eardrums.

They are sounding a strident announcement that the Big Job—the Boeing YB-52 Stratofortress is just about to take the air again in another test flight.

If you are closer you hear preliminary shrill whines from two midget Boeing gas turbines in a starter cart. They wind up the YB 52's Pratt & Whitney J57 engines rated at about 10,000 lb. thrust each. Then the eight big turbojets, one by one, add their volume and, after the first two, you can't hear the little turbines any more at all.

▶**B-36 Successor**—The taxpayer has a big stake in the YB 52, first Stratofortress to fly, and in the planes coming after it.

Both dollar wise, and in the future of U. S. national defense, the plane plays a key role.

It has been so promising in its design stage and in its early test flights that USAF has tapped it as successor to the even bigger Convair B-36. In doing so they passed over the Convair B-60, a sweptwing modification of the B 36, which Convair had groomed to succeed the 10-engine first intercontinental bomber.

The B-52 is the current entry of the bomber advocates who think that the day of the guided missile isn't here yet, and that until we are sure it is we need another Sunday punch ready to go. The first production B-52s were ordered as RB 52s, reconnaissance bombers. But they, like other USAF recon bombers,

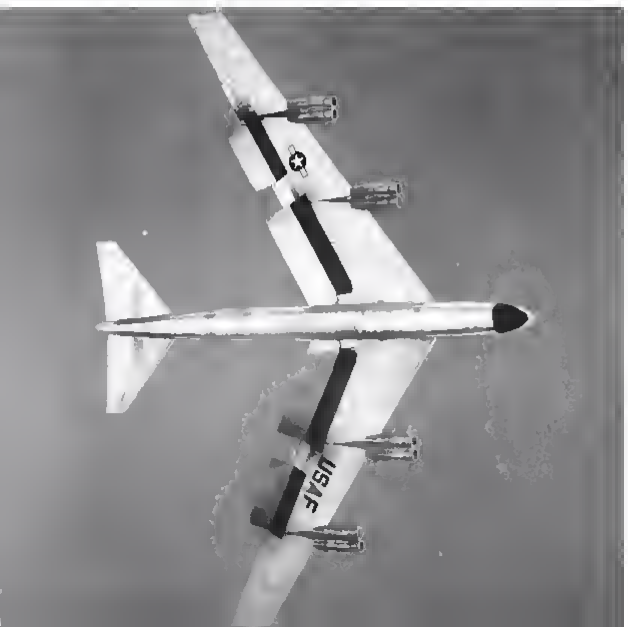
Giant Stratofortress Roars Skyward . . .

At top, the big bomber's eight P&W J57 10,000-lb. thrust-class jets are turned on full blast and the plane starts down the runway. With a mighty rumble, the YB-52 (above) clears the runway, and with flaps in lift position, its eight main wheels and outriggers dangling, starts climb.

Showing keen interest (right) as the big job is put through its paces over the field are, left to right Col. W. A. Davis, USAF representative at Boeing; Maj. Gen. William Morgan, Western Air Procurement District Commanding General; Maj. Gen. C. S. Irvine, AMC, Deputy Commanding General for Production; USAF Undersecretary R. L. Gilpatric and Boeing President William M. Allen.

FLAPS UP the YB-52 shows clean form as it shoes through the air, its eight J57s slung beneath the broad 35-deg. swept wings.

FLAPS DOWN viewed from directly underneath, its four large flap segments extended, the Stratofort takes on the shape of a giant arrowhead



will be ready to carry the A-bomb if necessary.

On that premise, the B-52 is being built.

Now, come over here to the edge of the two-mile-long Boeing Field main runway and watch the YB-52 take off.

▶**Clear for Takeoff**—Alvin (Tex) Johnston, one of the few old-school professional test pilots still in business, swings the enormous plane onto the runway, pivoting it on the small outrigger wheel at the right wingtip.

As he completes the turn he "pours the coal" to the eight engines so deftly that they crescendo smoothly into a louder and louder bellow.

The eight main wheels roll down the concrete to about the three-quarter point while you watch the transfer of the plane's load to the wing as flying speed is gained.

As the wing moves upward, the outrigger wheels dangle meaninglessly until they are snapped up into the wingtips.

Now the wing has taken the full load and flexes with it as the YB-52 lifts clear of the runway. The eight main wheels fold into the belly and the plane looks more like an aircraft less like a centipede.

When the YB-52 first gets away there's a mixed impression of bulk and power and grace that reminds you of a giant winged prehistoric saurian.

▶**Flight Crew**—In the cockpit with Tex Johnston are two other highly skilled test pilots. Lt. Col. Guy Townsend, co-pilot and USAF representative, who will take over the big plane after Boeing's first tests, and Boeing's Arthur Curren, who will fly the second of the B-52 series, the XB-52, just about ready for its first hop.

Eight distinct black smoke trails from the powerplants (typical of low-altitude jet operation) follow the plane in its climbout. This time, it's a very gradual climb over that big warehouse which a ground-minded grocery company erected just beyond the end of the long runway. Sometimes, though, the YB-52 moves up and out at a surprisingly steep angle.

▶**Chase Plane**—As the Big Job continues to climb, an Air Force pilot flying an F-86 "chase plane" hangs around solicitously, checking up on flight conditions that the YB-52 crewmen can't see for themselves. The chase pilot looks to see that the complex landing gear is properly tucked away, and that all eight "blow torches" are functioning as they should be and that the controls are operating properly.

This goes on as long as you can watch from the ground and finally big and little planes disappear, still climbing and heading toward Mt. Rainier.

Two hours later the Sabre comes in to land. The chase pilot takes on a new fuel load and gets away to rendezvous with the big job at some point and altitude not visible from the field.

Another hour passes and Tex radios the Boeing tower that he has finished this part of his test program. He's coming in.

▶**Final Approach**—Back here at the runway again you hear the YB-52 before you can locate it. There are the smoke trails and the glint of metal in the sun. The Big Job is already lined up on its final approach, miles out. Although it is moving at high speed, the letdown is still so gradual that the landing interval seems painfully long.

Wheels are already out and down and the enormous area of the four wide-span flaps hangs down as the plane takes shape. Then the wheels touch, almost at the end of the runway. Sometimes Tex will pop the drag chute.

There's the little pilot chute, and there comes the big one billowing out from its attachment at the tail. You can see it take hold and pull the big job back on its haunches in a surprisingly short runway length.

And that's the way a test flight of USAF's new intercontinental atom bomber looks from the ground at Boeing Field.

▶**Bombers or Missiles**—Ask Boeing Airplane Co.'s president William M. Allen, how he feels about bombers vs. pushbutton warfare, and he'll tell you his company is building both kinds of war implements.

"I disagree with my friend Dutch Kindelberger (J. H. Kindelberger, chairman of the board of North American Aviation, Inc.)," Allen says, "about how soon the missiles will replace the bombers. My timetable stretches out longer."

Allen expects his new B-52 to have a considerable life span before it gives way to another bomber replacement. The next one will probably be supersonic. When it is time for replacing the B-52's successor, the missiles ought to be ready. But if long-range missiles come along faster, Boeing also is planning for that eventuality.

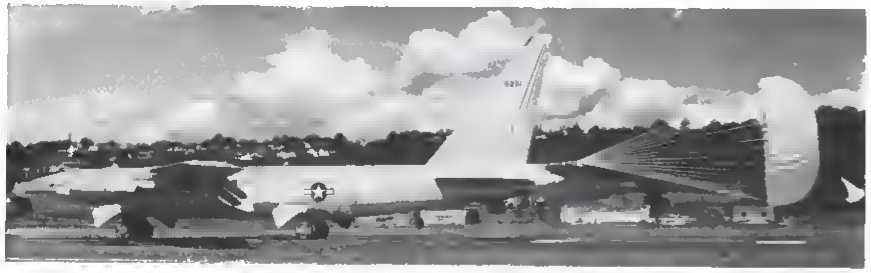
▶**Massive Tooling**—Out in the Boeing Seattle plant, massive heavy jigs and tooling are rapidly taking shape to build production B-52s. It is an easy conclusion that this kind of tooling is meant for high-volume production.

This was what an Air Force spokesman was talking to Congress about last year. He told the House Appropriations Committee in July, 1951 that the flyaway cost of the first airplane was $21.3 million, but that this includes special tooling, dies, jigs and fixtures valued at $12.5 million. The initial tooling cost of $50 million, the Air Force said, is spread over the first four aircraft (later identified as B-52s by the Air Force).

The entire tooling cost, the Air Force said, was to be amortized in one year. But if a production order were placed

YB-52 BANKS providing interesting contrast with near similar view of smaller earlier B-47 (below). B-52, though larger, looks cleaner.

B-47 BANKS showing slimmer wing and fuselage lines when compared with B-52. Six-jet Stratojet has been in large-scale production for some time.



BRAKING CHUTE has been popped during this landing of YB-52, slowing the big plane's roll noticeably. Drag chutes have become standard equipment on most new high-speed planes.

TOUCHDOWN photo shows craft just barely making contact with runway and wings flexing upward as they still carry the massive plane's weight. Braking chute is not visible, probably was not used

for 100 aircraft, the unit cost would drop down to $3.8 million. As a result of the recent selection of the B-52 over the B-60, a production order has been placed which, together with an earlier production order, adds up to about 70 planes.

▶ **In-Flight Refueling**—USAF has testified that the B-52 will be equipped for in-flight refueling. And it also has been disclosed that the B-52 will be equipped to carry external fuel tanks slung under its wings like its older and smaller sister-plane, the Boeing six-jet B-47.

Watching the B-52 fly, in comparison with the B-47s that also are flying out of Boeing Field, you get an idea of some of the advances that have been made in design of the newer bomber as a result of five years of building and testing the B-47.

▶ **New Wing**—The 185-ft. span B-52 wing is new, a product of aerodynamic knowledge that was just being compiled in the windtunnels when the B-47 design was frozen. It is different in airfoil section, planform, thickness ratio and control surface design. Most noticeable apparent difference is in the increased chord-to-span ratio and in the increased relative size of the B-52 flaps.

Sweepback on wing and tail is the same, 35 deg. Tip of the vertical tail is 48 ft. off the ground and the horizontal tail follows the modern all-movable tail design trend.

Fuselage appears heavy at first glance, but inspect the airplane with the ungainly gear retracted. From the careful design detail of the slim nose and the fine lines of the entire 153 ft. back to the tail you see a clean airplane.

▶ **Spoilers Seen**—The different method of control used is apparent when the plane takes off and lands. Main control laterally comes from a row of spoilers about midway across the upper wing surface, obviously power-actuated and presumably dynamically balanced to withstand the loads they have to take. Ailerons, apparently included to give the pilot a normal feel on the controls, are abbreviated flippers between the two sets of flaps on each wing.

Other niceties of design are apparent. The big tail fin will fold over horizontally, like the earlier Boeing Stratocruiser and B-50 tail fins, for ease in hangar handling. And at the top of the fin and at the trailing edge of the wingtips are translucent fiber glass panels which appear to cover the flush antennas you would expect such a fast and expensive new plane to have.

▶ **Photo Targets**—The eight tires are checkered black and white and a large black and white cross is painted on the fuselage to provide targets for photo theodolite observation.

The eight Goodrich wheels are the same that have already proved out, in sets of four, on the B-47. Goodrich brakes are fitted with a new kind of brake block which uses no rivets. The lining is cemented to a magnesium shoe and braking action applies equal pressure to the full circle of the brake drum. A narrow-cavity expander tube makes possible application of greater brake pressure with less hydraulic fluid. And when those brakes go on, their scream would make the hardiest hot-rod driver flinch.

▶ **Normal Stop**—Johnston has effectively braked the Big Job to a stop in a normal landing without opening a drag chute and had more than a third of the runway left.

As for takeoffs the Big Job doesn't yet seem to need any rocket-assist to carry loads that are being flown in present test phases. But built-in Rato installations are provided in the fuselage, essentially similar to those in the B-47, for the stretch in gross load which can be expected later on.

YB-52 TEST CREW from left to right, Boeing's Art Curran, "Tex" Johnston and USAF's Lt. Col. Guy Townsend check data

Another place the B-52 series can be expected to stretch later on is in power. Although its split-compressor J57 powerplants are considered the best now available in this country and are being eagerly sought for many other USAF and Navy plane installations, they are still in early development. Later version now under development can be expected to add much additional power as it is needed.

▶ **How Much Fuel?**—Two of the B-52's most closely guarded secrets are how much fuel she can carry and how high the Big Job will fly. But it is a fair assumption that the B-52 will not carry enough jet fuel to make the classic intercontinental bomber range of 10,000 mi. nonstop without refueling or provision for aerial refueling would not have been included in the design.

Flight crew and engineers praise the J57 engines, new as they are. An occasional tendency to surging is observed, but Pratt & Whitney is trying corrective measures for this. Both in power, and in specific fuel consumption, the engine appears to have an advantage over others now flying here.

▶ **Seven Engines Left**—In one landing observed at Boeing Field, only seven trails of black smoke were seen. Engine No. 4 was cut, due to low oil pressure, but the plane came in for a routine landing, with the comforting reassurance of seven good powerplants left.

It's probably early yet for the YB-52 to try for its top altitude performance. But the B-36 which it will replace will operate well above 40,000 ft., the USAF has announced. So it would be another fair assumption that the YB-52 should operate on a basis of power and design at least 10,000 ft. higher with even higher altitude performance within sight as the basic B-52 design continues to develop.

So that's the way it goes, a couple of times a week out at Boeing Field. As soon as the XB-52 takes the air the flight time should pile up even faster, and tests are on schedule now.

The test pilots see no real major problems in flying the fastest and most powerful big bomber on production order. And they are crowding their schedule to demonstrate its readiness for combat and recon work, against the day when production B-52s will be rolled out for squadron assignment.

Gen. Curtiss LeMay, chief of Strategic Air Command, wishes he had some squadrons of them right now.

Atomic Carrier for Navy Slated for '57

The Navy's first atomic-powered aircraft carrier is scheduled for completion by the middle of 1957 if all goes well.

The first hurdle will be formal approval for the project from the Joint Chiefs of Staff and Congress.

The second and perhaps less formidable obstacle is the technical problem of harnessing atomic energy to propel a ship. The contract for development of the atomic carrier engine has been let to Westinghouse Electric Corp. Observers who have followed the Westinghouse development of an atomic engine for submarines believe sufficient progress already has been made on atomic marine engines to insure eventual success of the carrier powerplant.

Principal advantage of the atomic carrier will be an almost infinite range and additional aircraft fuel capacity of about 10,000 tons. This fuel capacity will be required for ship's fuel on other carriers of the Forrestal class powered by conventional methods. The atomic carrier is expected to have a top speed of 40 knots compared with an estimated 32 knots for other Forrestal-class carriers.

The atomic flat-top is expected to carry aircraft similar to the jet-powered planes now in the development stage for the other Forrestal-class carriers.

The planes are the Douglas A3D bomber and the McDonnell F3H, Grumman F10F and Vought Cutlass in the fighter categories.

Navy's target date for completing the Forrestal is now December of 1954. The second carrier of this class, as yet unnamed, is due to be finished two years later. The atomic carrier will be the third in the Forrestal class.

Lovett Lambastes Campbell Proposal

Blunt military rejection of the aircraft procurement recommendations of W. L. Campbell, acting chairman of the Aircraft Production Board, was forecast last week by Defense Secretary Robert Lovett.

At his bi-weekly press conference Lovett lambasted the Campbell recommendations as unworkable and unrealistic.

"It wouldn't surprise me," Lovett stated, "if the military answers to the so-called Campbell Report were fairly blunt and fairly uniform (in rejecting the Campbell recommendations) . . . so I think Mr. Fowler's (Sept. 12 APB) meeting will be extremely interesting. I hope it is a profitable one, but I am not going to hold my breath until the decision is unanimous."

Lovett told reporters that if the Aircraft Production Board attempted to enforce its recommendations on the military in regard to aircraft types, "It would be a monstrous piece of idiocy unless, of course, the civilian agency making that determination is prepared to fly them in combat."

"The three separate services," Lovett said, "are charged with the procurement function. They are also charged with the establishment of requirements which can be reviewed by the Secretary of Defense or other statutory agencies."

He told reporters that the APB chairman's recommendations for aircraft type changes carried little weight with him because they had been prepared by a group of men with little experience in the aircraft industry. On the other hand, he said, "A recommendation from a responsible group of aircraft manufacturers that Type "A" and Type "B" are interchangeable would carry great weight with me."

"But an industrialist who has not devoted his lifetime or a particularly long time to the aircraft business cannot understand that any fighter or bomber is a compromise between desirable attributes. . . . You can't have a fighter with all the desirable attributes of all

fighter types It just isn't possible

"To be sure we don't want too many types for identical or very similar purpose But that is very different from saying arbitrarily we'll simply cut out this, that or other types This is what the board chairman of the civilian agency suggests"

SBAC Stars

- **New sonic bombers to make debut at show.**
- **Britannia and Princess also slated to appear.**

By Nat McKitterick
(McGraw-Hill World News)

London—The long-expected A V Roe and Handley Page "sonic" bombers will make their debut at the 1952 Society of British Aircraft Constructors air show at Farnborough, Hants, next month—if all goes well Both planes are scheduled to fly any day now

The Avro "delta" bomber, prototype of which will have Rolls-Royce Avon engines, is scheduled to be powered by the 10,000 lb-thrust Bristol Olympus engine when it goes into service The Handley Page craft, which has a new scimitar shaped wing, probably will have Armstrong Siddeley Sapphire engines when in service, though this prototype, too, may appear with Avons

Details of the two aircraft still are secret, but "sonic" is said to be a good word to describe their speed It's also a fair bet that the new craft will cruise at altitudes up to 60,000 ft and over

As launching sites for air-to-ground missiles, these bombers undoubtedly were in Prime Minister Churchill's mind recently when he said "The advent of new aircraft will profoundly affect the tactics of air warfare and anti-air defence"

►**Missile Test Equipment**—Both the Fairey Aviation Co and the Ministry of Supply will show missile test equipment in the static park at Farnborough And one company will exhibit a new research craft A new delta research plane will fly in the flying display

On the commercial side interest will center around the Bristol Britannia, four turboprop civil airliner designed to carry up to 104 tourist class passengers The Britannia, scheduled to fly for the first time last week will be powered by four Proteus III turboprops when it goes into service about 1955 The prototype has four Proteus II engines

The Saunders-Roe Princess, 10 turboprop flying boat also is expected to make its first public appearance at the show in a fly-past from its base at Cowes, Isle of Wight The flying boat is powered by four coupled Proteus II turboprops plus two single Proteus II outboard units

►**New Helicopters**—Two new helicopters are scheduled to make their appearance at the show the firm's first twin-engine helicopter, the Bristol 173 (seats 10 to 12) and the Saunders-Roe Skeeter, a completely reworked version of the old Cierva Skeeter (Cierva was brought out by Saunders-Roe a couple of years ago) Saunders-Roe hopes to find an American market for the two-seater Skeeter

All of Britain's new stable of fighters will be in the flying display the Gloster Javelin (G A 5, delta-winged fighter twin Sapphires), the Hawker Hunter Mark 1 (R R Avons) the Vickers Supermarine Swift (R-R Avons) the Vickers Supermarine 508 (twin Avons), the de Havilland 110 (twin Avons), the Fairey Gannet, (A/S Double Mamba)

►**Bombers**—In the bomber line, the Vickers Valiant four-Avon bomber will be back again this year This is the second prototype the first crashed last spring There will be four versions of the English Electric Canberra—one powered with the new Bristol Olympus 10,000-lb jet, one powered with Rolls-Royce Avons, and equipped with reheat another powered with A/S Sapphires, and a Mk T-4 Canberra trainer The Olympus Canberra isn't likely to be able to demonstrate the full power of the Bristol engine The engine will also be on view in the static display

In the civil line de Havilland will exhibit its first Mark 1A Comet equipped with long-range tankage and earmarked for Canadian Pacific Airways In the flying display D H will demonstrate its Sprite rocket motor installed in a Series I Comet

The display opens to the press Sept 1 and there follow three days for invited guests of SBAC After three public days the show will close on the seventh

Gen. Bain Is New Procurement Chief

Dayton—Brig Gen Walter G Bain, 42, is the new chief of the procurement division of the Air Materiel Command at Wright-Patterson AFB

He succeeds Brig Gen Phillips W Smith, whose new assignment is chief of procurement for the North Atlantic Treaty Organization

Educated at the University of Colorado and Massachusetts Institute of Technology Gen Bain was associated with Allis-Chalmers until 1940 when called into active duty as production engineering officer and technical executive to the commanding general at Wright Field He was transferred to the inspection division in 1943

He served as production manager for the Ladish Co, Cudahy, Wis, between 1945 and his recall to active duty in 1951

His most recent assignment was as chief of the Quality Control division

Gen Bain is rated as a senior pilot

'Pop' Cleveland Killed in Crash

Ephraim W (Pop) Cleveland made his last flight Aug 7th

The 62-year-old aviation pioneer, a vice president of Cleveland Pneumatic Tool Co, and a vice president and director of Electronic Research Corp., crashed on Mt Baldy, about 30 miles southeast of Seattle, during a heavy fog He was flying a Beech Bonanza Also killed were his wife, Lucille and his secretary Mrs Annabelle Emslie

The well-known aviation executive and pilot officially soloed in June, 1912 in a Curtiss pusher at Hammondsport, N Y

He was born in Naples N Y During World War I, Cleveland was chief civilian flight instructor for the Army at Ellington Field, Tex After the war he barnstormed and then became an airport operator in Pittsburgh He was one of the first to use an airplane as a business aid

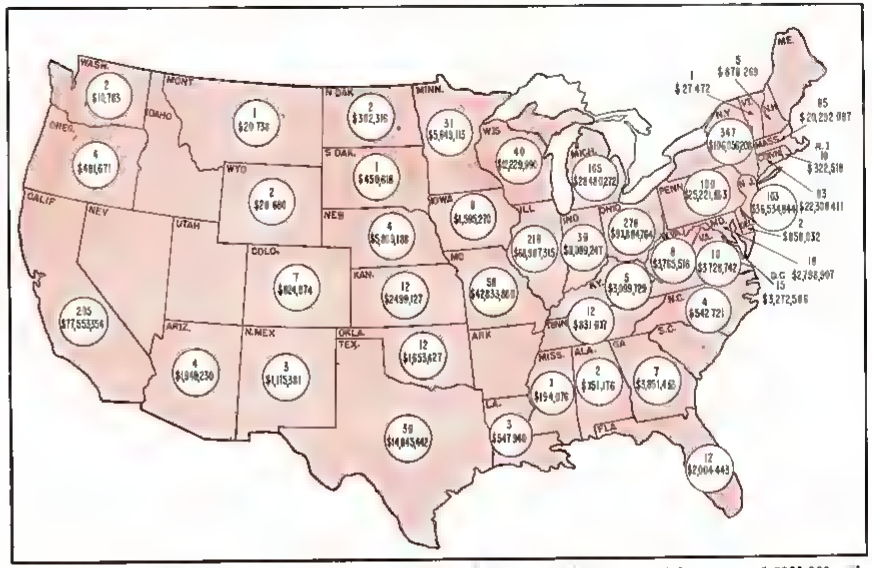
During his 41 years of flying he piled up more than 10,000 hours and attended almost every aviation classic in some official capacity On the fortieth anniversary of his solo flight, hundreds of the nation's top aviation personalities honored him at a dinner in Cleveland

Forge Press Plant Contract Is Let

Kaiser Aluminum & Chemical Corp has awarded an $11,550,000 contract to Dunn & Armstrong Inc, of Detroit for construction of a 360,000 sq ft aluminum forging plant at Newark, Ohio

The new facility is part of the Air Force's $389 million program to produce large aircraft parts with giant forging and extrusion presses Kaiser will operate two giant forging presses at the Newark plant and two extrusion presses at Halethorpe, Md Government expenditure for the two plants and their equipment will total $55 million

The four presses are being built by the E W Bliss Co of Canton Ohio The two extrusion presses will have capacities of 8,000 tons and one forging press will have a capacity of 25,000 tons hydraulic pressure while the second will be rated at 35,000 tons



SMALL BUSINESS PRIME CONTRACTORS' share of USAF business in 1951 was split among 1,186 firms, averaged $321,000 each

How the Air Force Aids Small Business

Small prime contractors will get over $500-million AF business this year, and trend is upward.

The Air Force tries to get small business into the defense picture in two main ways—through prime contracts and by persuading large prime contractors to subcontract. Kennard Weddell, Chief of the Office of Small Business, Headquarters, USAF, points with pride to the Air Force's record of small business participation in aircraft production. Here is part of the record:

• **Prime contracts.** In the first eight months of fiscal 1952, nearly one-half billion dollars of the over $5 billion spent by USAF was listed by the Office of Small Business as part of the small business potential. And of this half-billion-dollar potential, small business received 37%. Study has been made, and is continuing, of the reasons small business did not get an even larger share of this potential.

• **Subcontracts.** More than 90% of USAF money goes to large prime contractors. But a recent survey of four large primes, holding among them nearly $2.9 billion in contracts (face value), shows that they expect to place with outside plants—many of them small business—nearly $1¼ billion in subcontracts.

► **Organization**—Since the nature of the items produced for the Air Force is such that by far the greatest opportunity for small business participation is in the field of subcontracting, a major part of the Air Force's small business program has to do with promotion of subcontracting.

Operation of the Small Business Program is the responsibility of the Office of Small Business at Headquarters, Air Materiel Command, Wright-Patterson AFB, near Dayton, Ohio. This is where 96%, dollar-wise, of all Air Force purchases are made. The office is headed by William H. Hine.

Among the 35,000 Air Force personnel located at this huge base are the more than 500 buyers who evaluate the bids and proposals, and recommend the awards on prime contracts to the Contracting Officers. Hine has working under him, directly responsible to him, a staff of assistants. They include:

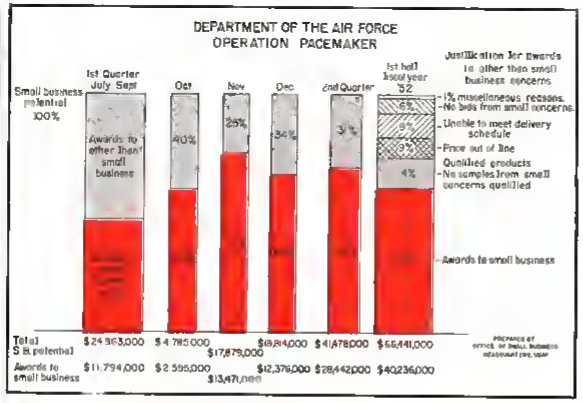
• **One Small Business Specialist,** who handles interviews with prospective suppliers in the category of small business.

• **Seven Small Business Analysts,** who screen the procurements and work closely with the buyers to try to secure the greatest participation by small business concerns as prime contractors.

All of these men are civilians, all have had considerable business experience, and all have had years of procurement or production experience in the technical items purchased by the Air Force.

In addition, each District and Regional Office is staffed with Small Business Specialists, 27 being civilians, and ten officers called in from the Reserves.

► **Training Program**—In July, 1951, AMC initiated a "small business training program." First, a meeting of all



buyers and Contracting Officers, as well as the Small Business Analysts on duty there, was held at Headquarters, Air Materiel Command, to indoctrinate them in the enlarged Small Business Program. Later in the month all Small Business Specialists throughout the country were called in for a two-day conference. This was also attended by procurement officials of Air Materiel Command and the conference was opened with a talk by Roswell L. Gilpatric, Undersecretary of the Air Force, on the policy of the Air Force relative to small business, and the importance of that policy to the Air Force procurement program.

Since that time, periodic conferences of Small Business Specialists have been held on a District basis. In March of this year, all Small Business Specialists of the Air Force were again called into Headquarters, AMC, for the second two day conference.

Small Business Share

Of the 2,747 prime contractor facilities doing business with the Air Force through AMC at Dayton, 1,886 or 70% of them are independently owned and operated by small business concerns. The dollar value of the prime contracts in these plants averaged $321,000 for each plant at the end of December. On June 30, 1951, the average had been $186,000.

Local purchases made by approximately 105 depots and bases are for housekeeping items. Altogether these local purchases amount to less than 4% of Air Force procurement, and 74% of these local purchases, dollar-wise, are placed with small business concerns without the physical presence of any Small Business Specialist. It is at AMC Headquarters that the major purchasing activities are carried on, to the extent of 96.4% of the Air Force dollar. For the first eight months of the fiscal year 1952, this amounted to $5,186,338,000 exclusive of Interdepartmental and Interservice purchases.

▶ **The Criterion**—What items can be assigned for small business procurement?

When USAF's enlarged Small Business Program started a year ago, the first project was to set in motion a system of reporting within the Air Force that would clearly show this small business potential. During fiscal year 1952, the Office of Small Business made a careful analysis of all procurements to determine that potential. It was done on the suitability of the item itself as lying within the capabilities of small business concerns.

Here is the way Hine explains it: "If an item is of such a nature that its production does not require a huge organization necessarily involving over 500 employes, then it belongs in the small business potential on all procurements for that item.

• "Although it may be an emergency procurement and no small plant is currently tooled-up to produce on time, the dollar value of that procurement is still in the small business potential.

• "It may be a sole source procurement, and possibly for a proprietary item controlled by a large concern. It is still listed in the small business potential, for considerable progress is being made in the reduction of these sole source procurements by arranging licensee-licensor agreements.

"The point I wish to emphasize is that in determining the all-important figure which represents the maximum small business potential, our Small Business Specialists consider only the suitability of the item itself and not the suitability of a particular procurement of that item.

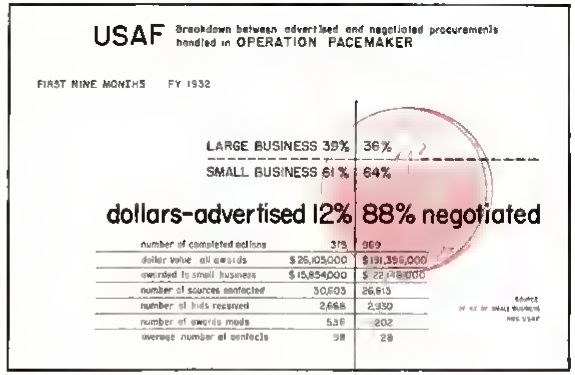
"In determining the suitability of the item, the Small Business Specialists, when appropriate, naturally consult with the buyers, with the initiators of the Purchase Request, or with Engineering Standards personnel. The final responsibility, however, is always that of the Office of Small Business."

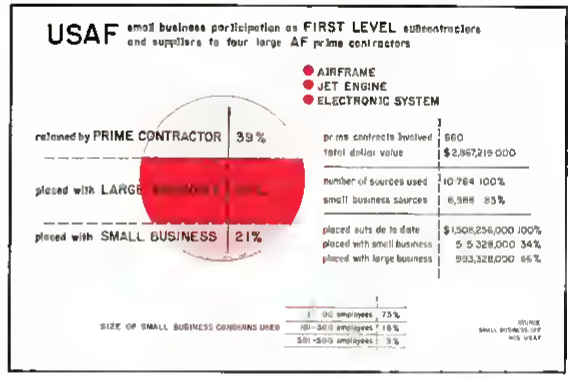
▶ **Statistics on Potential**—The maximum small business potential in all Air Force procurement in the first eight months of fiscal year 1952, both in dollars and in percentages, amounted to $482,535,000. For the entire eight-month period, the over all procurement figure was $5,186,338,000.

Wide fluctuations occur from month to month in the percentage figures, which, of course, are brought about by sizable purchases of airframes and such items in one month as against another.

The Air Force's subcontracting program is directed at that $4,700,000,000 figure (the difference between $5,186,338,000 and $482,535,000) to see that prime contractors distribute as much of that as they properly can with small business concerns.

"Our prime contracting program is directed at that $482,000,000 figure, the placement of which we control directly, to ensure that small business concerns get their fair share of that potential," Hine explains.





Operation Pacemaker

In small business potential, and included in the awards to small business concerns, are the figures of a unique activity at Wright-Patterson AFB—Operation Pacemaker.

In order to determine the best method of reaching small business firms, AMC set up special procedures to see that the potential of small business was studied in every procurement. Here's how it works:

• Every Purchase Request, other than those classified and those under $10,000, received by the Procurement Division is given a preliminary screening by the Small Business Specialists to determine whether or not the item called for belongs in the small business potential. If it does, the Purchase Request is so labeled.

• The buyer may take no major action on that Purchase Request without consultation with the Small Business Specialist handling the case. The buyer determines, in consultation with the Small Business Specialist, the procurement method to be followed, whether by formal advertising or by negotiation. They determine together whether or not the item called for on the Purchase Request and the circumstances surrounding this particular procurement make it desirable to have multiple awards in order to broaden and maintain the base.

• The Services Section is then called upon to furnish the bidders' list from its mechanized system. This mechanized bidders' list consists at the present time of approximately 18,000 potential sources. Small Business concerns not already on this list, but who desire to be, may be qualified through the appropriate Regional Office.

• If the procurement is to be handled through formal advertising, appropriate potential sources on the mechanized bidders' list submitted by Services Section are contacted. If it is to be handled by negotiation, the particular concerns to be contacted are determined by consultation between the Small Business Specialist and the buyer.

• The Small Business Specialist is responsible for the determination as to whether or not the procurement should be publicized in the Daily Synopsis of Proposed Procurements, published by the Department of Commerce. The sole basis for this determination on his part is whether or not there is any opportunity for participation by small business concerns in the particular procurement.

• The Services Section then sends the bid data to the predetermined sources and also a complete set of each of Air Materiel Command's 28 Regional and Sub-Regional Offices.

Business concerns who have not received bid sets directly from the Services Section, but who desire an opportunity to bid, or make proposals because of having seen it in the Synopsis, can make use of the bid sets in the Regional Offices and submit their bids or proposals directly to the Procurement Division. They receive the same consideration that is given to bids and proposals that were specifically invited or requested. By this set up, no one is barred from bidding.

• When the bids and proposals are in and the buyer has made his appraisal, the buyer discusses the awards he pro

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

Betty Anderson, English gentlewoman, mother of five and grandmother of 14, directs the "last outpost" of the Wm. R. Whittaker Co., Ltd.—the final inspection department.

The blonde, hazel-eyed matron, listed on the company payroll as Mrs Elizabeth D Anderson, has terminal responsibility for every valve and valve part that goes out of the Hollywood plant

Seated in her tiny glass-enclosed office and peering at the pages of her special bookkeeping system through harlequin glasses, Betty talked of final assembly and of the Whittaker company.

"Some days we'll inspect 500 valves, worth perhaps $50,000," she said "The next day we may check 700 valves.

"I have a staff of three girls, all experts All of us work to blueprints to keep up with all the changes First we make a visual inspection of every valve for color and finish Then comes a check of serial number, code colors and rubber seal date tags, a check for possible thin spots porosity, scratches, damaged screws, improper safety wiring manual operation wherever possible a spot 'mike' check for dimensions, capping of all open ports, encasing in Pliofilm bags, tagging for shipment [illegible]

This is Whittaker's final—a final inspection of each valve following the many specialized inspections operational tests and Air Force approval checks

"Of the thousands of valves that pass through here each week, we send back less than one percent, almost invariably for a wrong code number, a slight scratch in handling, or some such minor defect,' she explained in a soft voice tinged with British accent

"They have to be perfect you know"

The businesslike Englishwoman, now 52, has been with Whittaker for 10 years The death of her husband brought the change from kitchen to blueprints—and you'll believe her when she says she's loved every minute of it

"I was lucky," she smiles "This was the first place I asked for a job I started in assembly, then they assigned me to inspecting oxygen valves A year later I was made lead girl on regular inspection Then came final inspection"

Betty knows every Whittaker valve and the purpose of each. They're all as familiar to her as the kitchen pans in her apartment.

"As they come through," she said, adjusting a vagrant wisp of her greying, upswept hair, **"I imagine where they'll be a little later—on a Sabre Jet high over Korea, deep inside a Siralojet wing, or helping carry passengers across the Atlantic.**

"We know their part numbers by heart, of course, but we have pet names for them, too We call the two inch fuel shut-off valve the 'spider.' A little oxygen valve is 'submarine,' and the big black fuel transfer control valves are 'guillotine'."

Has Betty seen many changes in the company during her decade of service?

"My word yes!" she exclaimed, falling into a typical English expression "It's most phenomenal When I joined the company it was housed in an old real estate office Now look at it. A big modern plant, hundreds of people hundreds of valves millions of dollars in orders

"But it's still a family in the real sense. People here haven't grown apart with the growth of the company. They work together and they work better because of it. In my mind that's the big secret of Whittaker success."

And what do her associates from President Bob Whittaker on down, think of Betty?

"A true gentlewoman tops at her job a wonderful gal ."

poses to make with the Small Business Specialist

No award can be made on any procurement until the buyer has received written clearance from the appropriate District Office on what is called a Facility Capability Report (AVIATION WEEK Aug 4, p 269)

• Upon reaching agreement with the Small Business Specialist, the buyer then recommends the awards and the recommendation is jointly signed by the buyer and the Small Business Specialist If there is disagreement between the Small Business Specialist and the buyer, the disagreement is referred to the Procurement Committee for resolution

It is interesting to note that since Operation Pacemaker was established on July 1, 1951, only three such disagreements have had to be referred to the Procurement Committee, and all three decided in favor of the position taken by Office of Small Business

• In the event any award is made on one of these procurements to other than a small business concern, the buyer must justify his action in writing, sign it, and this justification is reviewed by the Procurement Committee. A great deal of the effectiveness of Operation Pacemaker is due to this requirement for signed justifications, the Small Business Office believes

What They Learned

Operation Pacemaker has provided the Air Force with some very important and useful information as to why small business concerns received only 63% of the procurements for items capable of production by small concerns

"These figures point up to us," Hine states, "the areas which require careful attention and study on our part to eliminate any factors which unequally affect small business concerns

"The largest figure in the justification column was caused by the inability of small concerns to meet delivery schedules," Hine says. "But we are working diligently with the buyers to eliminate the few situations where Invitations to Bid or Requests for Proposals are issued at such a late date in the procurement cycle that only those currently tooled up could possibly meet the delivery schedule This is not a simple problem, but we are giving it our close attention

"There is also the decided possibility that there are other thoroughly competent small business concerns who did not submit bids, but who might have met the delivery schedules

• "Six percent of the business was lost by small business concerns through the failure of any small concern to submit a bid or proposal Here again the broadening of our base of potential bidders should help take care of this situation.

• Six percent of the business went to other than small business concerns because the procurements were for qualified products, and at the time the award had to be placed, no small concerns had successfully qualified their products This too is being watched carefully by the Small Business Specialists

• "It is gratifying to us to note that the business lost by small concerns due to their not being qualified technically, or not having the necessary facilities, or not bidding according to specifications, amounts to a very small figure, approximately 4%.

• "This leaves us with only one other reported factor which brought about awards on these suitable items to other than small business concerns and that is the factor of price being out of line."

Hine sums up the results of Operation Pacemaker in the first nine months of fiscal 1952 "Small business concerns met all of the qualifications and also underbid large business concerns for 63% of the dollars involved They met all of the qualifications, but bid too high on 8% of the dollars involved They failed to meet the qualifications regardless of price on 29%."

▶ **New Sources**—Considerable progress has been made in securing more new sources among small business concerns as prime contractors In the first eight months of fiscal 1952 a total of 4,810 contracts were placed by the Procurement Division, Air Materiel Command, including those on Purchase Requests for less than $10,000. 2,371 of these contracts were placed with small business concerns including 392 who had not previously received prime contracts of any type from the Air Force

New small business sources, therefore, received 8% of the total contracts placed and 12% of the contracts awarded to all small business concerns In this same period, of the 1,005 contracts placed with small business concerns in Operation Pacemaker 194 or 19% went to new sources

▶ **Negotiation vs Advertising**—There has been a great deal of discussion on the point of whether small business fares best under negotiated procurement or under advertised procurement As a result of Operation Pacemaker Air Force is now able to present pertinent and factual data which shows the true situation insofar as Air Force procurement is concerned.

On the suitable procurements handled by Operation Pacemaker 12% in dollar value were handled by formal advertising and 88% in dollar value by negotiation

• Of those handled by formal advertising small business concerns received 61% dollar wise.

• Of those handled by negotiation,

small business concerns received 64% dollar wise.

Small business not only received a greater percentage in negotiation, it received a greater percentage of a much greater volume of business.

▶ **Many Bidders**—This same study points out some other interesting data:

• In the procurements handled through formal advertising 30,603 business concerns were solicited in order to receive 2,665 bids which resulted in 536 awards on 313 procurements, an average of 98 solicitations on each Purchase Request.

• In negotiation, 26,813 concerns were solicited which resulted in 2,930 proposals in order to make 1,202 awards on 969 procurements, an average of 28 requests for proposals on each Purchase Request.

This is quite a change from the early days of negotiation when, because of extreme urgency, negotiations were conducted with only two or three potential suppliers.

Pushing Subcontracts

As to the 90.7% of the Air Force dollar which must be turned over to large prime contractors, AMC has been carrying on an aggressive campaign to bring about the maximum practicable degree of participation by small plants.

The Air Force necessarily holds the prime contractor responsible for the satisfactory performance of the item he produces, and this at once imposes certain restrictions on the requirements which can properly be made on the manufacturer as to the manner in which he meets his obligations or the sources which he elects to use.

In the contract, signed between Air Materiel Command and the contractor, it states "The contractor agrees to accomplish the maximum amount of subcontracting to small business concerns that the contractor finds to be consistent with the efficient performance of the contract." Further, at the time the contract is placed, the prime contractor is required to state the amount of subcontracting which he intends to place.

On Aug. 28, 1951, Air Materiel Command by letter to all prime contractors required them to keep such records as would clearly indicate the number of employes of the concerns with which they placed orders or subcontracts. This serves two purposes:

• It provides a ready means of securing information at the time AMC calls upon a prime contractor to show how well he has performed under the subcontract clause in his contract.

• It also serves to keep constantly before the prime contractor's purchasing agents the fact that small business concerns must be given due consideration.

▶ **Point of Contact**—This subcontract

program requires team work between the prime contractors, the District Offices of the Air Materiel Command, and the Small Business Specialists in the Regional Offices of Air Materiel Command

▶ **Field Specialist**—Small business concerns who contact the Air Regional Offices do so for many reasons, but mainly to establish themselves to receive opportunities to obtain either prime or subcontract work.

When these concerns make their initial contact, each is asked to give a history of its business, including date of establishment, number of employes, skills represented, square footage of manufacturing area, types of process ing, presence of engineering staff, amount of working capital, concerns for which it worked as a subcontractor, and items produced.

The Small Business Specialist evaluates the information to determine whether the firm is better suited as a prime contractor or as a subcontractor.

If he decides the company should apply for prime contracts, the firm is asked for other information that goes into the direct procurement machinery at AMC Headquarters.

▶ **If a Subcontractor**—With an evaluation as a subcontractor, the contractor is asked to submit a listing of his capital equipment so that it may become a part of the facilities file of the office.

The contractor is told that his name and facility listing will be furnished to prime contractors. Further, his listing will be established on this office list of contractors desiring subcontract work. The contractor is given a list of some 600 prime contractors who have had, or currently have, prime contracts, this is for contracts from all Government purchasing agencies.

Should the contractor require assistance, the Small Business Specialist will outline the basic points a contractor should cover in the contacting of the prime. In some instances, specific information can be given as to prime contractors presently taking on new subcontractors.

▶ **Subcontract Statistics**—A consolidated report of four large Air Force prime contractors, covering the subcontracts and the purchases they have themselves made reveals some interesting statistics, although it goes no further than the first tier. One of these prime contractors is an airframe producer, one makes jet engines, and the other two produce large electronic systems. They are located on the West Coast, the East Coast, and the Middle West.

These four large concerns hold 660 prime contracts from the Air Force, having a face value of approximately $2,867,219,000. They expect to retain for operations in their own plants, including payroll, engineering, administration, taxes, and profit, but not including production materials, 39% of this amount, or $1,117,672,000. They expect to place with outside plants, independently owned, 61%, or $1,749,547,000.

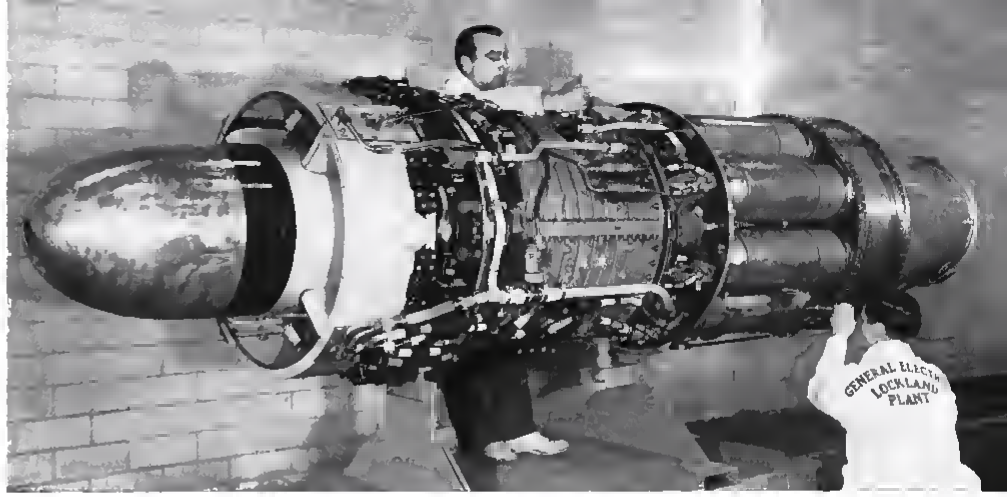
As of Jan. 1, 1952, they have placed outside their own organizations a total of $1,508,256,000.

- 66% of this amount, about $1 billion, has been placed directly with 1,776 large business concerns as subcontractors, parts manufacturers, and suppliers of raw materials.
- 34% of this amount, or $515,328,000, has been placed directly with 8,988 small business concerns as subcontractors and suppliers.

There are only four prime contractors, yet they are using between them 10,764 other business concerns, each of whom in turn uses many others, so that figure could be multiplied several times.

Of the subcontractors and suppliers in this first tier, 83% are small business concerns. Of these small business concerns, 73% had 100 employes or less, 18% had from 101-300, and 9% had from 301-500 employes.

This is an indication of how that figure of $4,700,000 placed by the Air Force with large business concerns is spread out to the benefit of small industry.



THE J47-GE-27, newest production model in G-E's "all-weather" J47 series, will power the North American F-86F Sabre. A modified -27 will power the Navy's FJ-2 Fury, carrier version of the F-86. Sister engines, the -23 and -25, are powerplants for the Boeing B-47B Stratojet.

Big Jig Speeds Super Connie Floors

Magnesium floor sections for Lockheed Aircraft Corp.'s Navy Super Constellation transport (R7V-1) are being produced at a fast clip with the aid of a huge drill jig.

This Lockheed-designed tool, reported to save thousands of production manhours, is a multi-section, two sided device more than 35 ft. in length and almost 18 ft. high. Lockheed says the tool frees floor space which would otherwise be required for eight standard floor jigs. A crew of 15 production workers can be accommodated on each side of the jig for drilling the holes for bolting and tiedown fittings.

Each of the separate drill-plate sections—there are ten of them—are maneuvered vertically to or from a storage rack by electric motors. Safety switches insure that only a single panel on each side of the jig can be moved at one time.

Width of the magnesium floor prepared in the jig consists of 22 T-shaped extruded "planks," each 5 in. wide. Varying lengths of the planks are bolted together to form the 73-ft.-long cargo floor. This deck will support a load of 300 lb./sq. ft., is reported to weigh 70 lb. less than a similar wood structure.

PRODUCTION BRIEFING

▶ **Abrams Instrument Corp.**, Lansing, Mich., has received two USAF contracts totaling more than $750,000 covering radar recording cameras for ultimate use by Navy.

▶ **Aircraft Engineering & Maintenance Co.**, Oakland, Calif., has received a $7.5 million Air Materiel Command contract for work on heavy military transports running through Aug. 1, 1953. Aemco is employing two shifts totaling 1,400 employes.

▶ **Aluminum Co. of America** plans to erect a $4.5 million rolling mill at Davenport, Ia., for aircraft work. USAF will get first call on output. Facility will be capable of rolling ten-foot widths, tapering sheet aluminum in 35 ft. lengths and handling hot or cold ingots.

▶ **California Reinforced Plastics Co.** has purchased a 20,000 sq. ft. building in Oakland, Calif., nearly double floor space available at its two former locations in Berkeley. It will permit firm to up output of ½ in.-celled aluminum honeycomb and pre-shaped glass fabric honeycomb for radomes and other curved surfaces. Firm also has named Hexcel Products Co. as its sales and engineering representative, with Roger C. Steele as manager.

▶ **Dept. of Defense Production**, Ottawa, placed $6,238,500 in orders for aircraft parts and equipment during period May 16-June 15. Sperry Gyroscope of Canada Ltd., Montreal got largest single order, $4,346,500 for instruments.

▶ **Glenn L. Martin Co.**, Baltimore, Md., has received an additional order for P5M-1 Marlin flying boats from Navy, will also build an air-sea rescue version for the Coast Guard.

▶ **Beckman Instruments, Inc.**, So. Pasadena, Calif., has opened a large new plant for production of synchros and associated components.

USAF CONTRACTS

Following is a list of recent USAF contracts announced by Air Materiel Command:

Aeushnet Process Co., New Bedford, Mass., gaskets $89,806.

Adel div., General Metals Corp., 10777 Van Owen, Burbank, spare parts, $37,410.

Aeroproducts div., General Motors Corp., Dayton, actuator kits, 1,000 ea., $50,852.

Aeroquip Corp., 300 South East Ave., Jackson, Mich., collar, $38,310.

Aero Instrument Co., 5105 Denison Ave., Cleveland, lube pitot stalls, 3,994 ea., $66,931.

Aircraft Hardware Mfg. Co., Inc., 810 Edgewater Rd., Bronx, N. Y., elbow, plug & tee, 205,188 ea., $60,007.

Aircraft Products Co., Church Rd. & Crooked Lane, Kina Manor, Bridgeport, Pa., pump assembly, 102 ea., $32,155.

AiResearch Mfg. Co., 9851 Sepulveda Blvd., Los Angeles, air turbine engine starter, Air Force pneumatic starter, 102 ea., $71,823.

American Brake Shoe Co., Kellogg div., Rochester, N. Y., air compressors, $60 ea., $137,510.

Ansco div., General Aniline & Film Corp., Binghamton, N. Y., photographic film, $172,810; photographic film, $44,901.

Aro Equipment Corp., Bryan, Ohio, oxygen regulator assembly, $1,124,762.

Baldwin, Inc., Cincinnati, lubricator, 138 ea., $23,316.

Barber-Colman Co., 229 Loomis St., Rockford, Ill., box assembly, heater control, $46,043.

Bastian Blessing Co., 4201 W. Peterson Ave., Chicago, cable assembly, valve release, dwg. 99 B 3502, 14,200 ea., cable assembly, valve release, dwg. 40 A 19869, 30,490 ea., disc assembly, 181,100 ea., $20,568.

Beech Aircraft Corp., Wichita, spares, $750,000; aluminum fuel tanks, $260,440.

Belden Mfg. Co., Chicago, power cable, $33,509.

Bendix Products div., Bendix Aviation Corp., South Bend, wheel assembly, $43,206; brake assemblies, 960 ea., wheel assemblies, 100 ea., $247,748.

Bendix Radio div., Bendix Aviation Corp., Baltimore, relays, 1,000 ea., $42,280.

Bethlehem Steel Co., Inc., Bethlehem, Pa., tool steel MRO program, 93,000 lb., $42,890.

Bliss, E. W., Co., 1270 Raff Rd., S. W., Canton, Ohio, trim presses, 14 ea., $90,040.

Blue Heron Cranes, Ltd., 6439 Baldwin St., Oakland, Calif., screw steel shackle, 3,170 ea., $25,322.

Breeze Corps., Inc., 41 South Sixth St., Newark, N. J., indicator assembly & shaft assembly, $54,147; conduit assemblies, $35,893.

Briggs & Stratton Corp., 2711 North 13th St., Milwaukee, spare parts, $87,830.

Brodie, Ralph S., Co., Inc., 61st & Lowell Sts., Oakland, Calif., fabrication of spare parts, $54,911.

Brown-Brockmeyer Co., 1000 S. Smithville Rd., Dayton, bench grinders, 1,150 ea., $57,503; grinder & buffer, comb., 470 ea., $75,201.

Brown-Line Corp., 341 N. Foothill Road, Beverly Hills, Calif., tiedown, cargo aircraft, $30,746.

Buchsbaum, S., & Co., 1707 S. Michigan Ave., Chicago, cargo aerial delivery container, 38,520 ea., $2,210,711.

Cessna Aircraft Co., Wichita, airplanes, 2 ea., data, 1 lot, engine, 1 lot, eng. changes, 1 lot, $176,000.

Champion Spark Plug Co., 900 Upton Ave., Toledo, spark plugs, 314,000 ea., $806,848.

Chelsea Products, Inc., 629 South Ave., Plainfield, N. J., air circulating fan, 15,200 ea., $710,120.

Chicago Pneumatic Tool Co., 670 East Larned St., Detroit, pneumatic riveter, $163,830.

Cole Laboratories, Inc., 42-25 9th Street,

Long Island City, N Y, acid hydrochloric, 190 918 lb, acid, hydrofluoric, 40,872 lb, $63 518

Cane, C G., Ltd. Elkhart, Ind, telereel tester, 267 ea, $82 540

Continental Aviation & Engineering Corp 1500 Algonquin Ave., Detroit, spare parts $40 000

Continental Engine Co., Aircraft Engine div, Muskegon, Mich, spare parts, $61 763 spare parts $57 147

Crosley Motors, Inc, 2630 Spring Grove Ave, Cincinnati, bomb shackle 5 909 ea, $136 688

Deutsch Co., 7000 Avalon Blvd, Los Angeles, elbow nipple, plug 003 050 ea $95 706

Dewell, Inc, Lancaster, Pa, new, 60 ea, commercial handbook 121 sets $34 140

Diebold Inc, Mulbury Rd S E, Canton Ohio, office safe $45 651

Douglas Aircraft Co Inc, Santa Monica Calif, spares $150,000

DuMont Laboratories, Inc, Allen B 750 Bloomfield Ave, Clifton, N J., photographic equipment, $55,496, electron tube, 1 000 ea, $42,480

Eastman Kodak Co, 343 State St, Rochester, N Y, photographic film $30 370, photographic film, $30,077, photographic film $103 401

Eclipse-Pioneer div, Bendix Aviation Corp., Teterboro, N J, oxygen regulator assembly $73,012 spare parts $116 902 transmitters, $81,465 instr maintenance parts $38 820 assemblies, subassemblies $500 000 starters 101 ea., $104 542

Electric Auto Lite Co, Port Huron, Mich, cable, 600 000 ft., $38 700

Electric Indicator Co., Camp Ave., Springdale, Conn, antenna position simulators 326 ea, $105,187

Federal Motor Truck Co, 5780 Federal Ave, Detroit spare parts $470 930

Fenwal, Inc, Ashland, Mass, thermo switches, 3,080 ea., $100 562

Fiber Chemical Corp, P O Box 210 Matawan, N J, acid, chromic, 128 870 lb $30 172

Franklin Machine Products Co., Inc., Near Tavern Rd, West Trenton, N J., lead assembly $69 360

General Electric Co., 1 River Rd, Schenectady, N Y, spare parts, $103,874 engine instr maint. parts 72 items, $94 218.

General Fireproofing Co, Youngstown Ohio, engineer seal $63,528

Goodyear Tire & Rubber Co., Inc, 1144 E. Market St, Akron, brake assembly $144 254 wheel assembly, low pressure, main, 95 ea., wheel assembly, nose, 17 ea., brake assembly, 20 ea., $26,028

Goshen Rubber Co., Inc., Goshen, Ind., O-rings (gaskets), $85,838.

Guardian Electric Mfg. Co., 1601 W. Walnut St, Chicago, switch, 1,000 ea., $26 240

Haloid Co, 2-20 Haloid St., Rochester N Y, photographic paper, $215,863

Hass Brothers Instr. Co., 6226 Ritchie Rd, Washington D C., barometers, 103 ea $3 040

Helldoerfer-Castellini, 414 West First St, Dayton, 2 solenoid systems, $121 720

Junk & Heintz, Inc., Cleveland, tachometer generator 1 581 ea., $38 705., electric tachometer generator, 1,672 ea., $40 500., starter, 2,363 ea., $678,476., holder & brush assemblies, $63 967

Johns-Manville Sales Corp, 22 E. 40 St., New York, asbestos cloth 200 000 sq. ft., $138 000.

Jones & Lamson Mach. Co, 180 Clinton St, Springfield Vt., centour comparator 9 ea., $59,289

Kerkow, Inc., Herbert 480 Lexington Ave, New York, mellen picture script, $32,994

Kingsy Co., E. A., Cincinnati, lathe, vertical turret 6 ea., $275,703; horizontal boring mill 2 ea., $125,486.

Kollsman Instr. Corp., 80-08 45 Ave, Elmhurst, N Y, airspeed indicators, 210 ea., $36 317

Langa Machine Works Inc, Henry G., 100 H Moy St, Chicago, glass edging & grinding machine, 60 ea., $48,090

La Plue & Co, Arthur S., 9001 S Knox Ave., Chicago, acid sulphuric, 223,540 lb., $30 500

Lake Shoe Eng Co., 6-168 General Motors Bldg, Detroit, plate, 500 ea., $104 540

LeBlond Mach. Tool Co., R H, Cincinnati, lathes 130 ea., $917,162.

Leland, Inc., G H, 123 Webster St, Dayton, solenoids, 10 927 ea, $34,900; 1 600-va laverters, 1 047 ea., $790,038

Linde Air Products Co., Union Carbide & Carbon Corp., 30 E 42 St., New York, gas cutting machine 10 ea., $67 626

Liquidometer Corp., 60-10 Skillman Ave, Long Island City, N Y, liquidometer tester, 877 ea, $143,171.

Lord Mfg Co., Erie, Pa, engine shock mounts $140,064

Magnesium Co of America, 5222 Indianapolis Blvd, East Chicago, Ind., container assembly 653 ea, $60 936

Mallory & Co Inc, P. R., 3000 E Washington St, Indianapolis, bomb release control 1,407 ea., $135 019

Manley Air, American Chain & Cable Co Inc, 1100 E Princess St, York, Pa., fire spreader 284 ea, $20 119

Manefield & Green, Cleveland, pressure gauge tester 713 ea, $224 240

Mercury Trading Corp., 157 E McMicken Ave., Cincinnati, radio receivers, 146 ea, $184,076

Metropolitan Elec Mfg Co, Long Island City, N Y, airport lighting control panel, $40,122

Midway Electric Supply Co., Inc., 116 W 32 St, New York, electrical connectors $120 695

Millard Associates, Inc, Box 33, Blythebourne Sta., Brooklyn, N Y., cups, 2 250 ea $55 913

Minneapolis Honeywell Regulator Co, 2600 Ridgeway Rd, Minneapolis, indicator, $1,500,000

Monsanto Chemical Co., 1700 S Second St, St. Louis, acid phosphoric, 303,840 lb, $61,921.

Mueller Co., 2001 E. 10 St., Los Angeles, elbow, 168 600 ea., $89,265

National Die Casting Co, 3833 W Touhy Ave., Chicago, accelerometers, 9 304 ea., $200 000

National Standard Co, Niles, Mich, steel wire $147,000

North American Aviation, Inc., Los Angeles, kits $26 374 T-6G aircraft, 11 ea., $170 918

Nelone Inc, Madison & Red Bank Rds, Cincinnati, pressure altimeter, 9,450 ea., $894 000

Otto Heme Inc, 4300 Olive St., St. Louis, mount, vibration 93 870 ea., $51,630

Pioneer Parachute Co, Inc, Manchester, Conn., parachute canopy assembly $33 800

Plomb Tool Co., Los Angeles, screw driver bits & holders, $30,000 ea., $87 320

Precision Rubber Products Corp., 6130 Oakridge Drive, Dayton, O rings, $105,625

Radioplane Co., Van Nuys, Calif., rotary launcher, $74 500

Rouland Corp, 4045 N Knox Ave., Chicago, electron tube, 1,000 ea., $41,500

Remington Rand, Inc., 25 N Jefferson St., Dayton, photographic paper, $64 853

Republic Aviation Corp, Farmingdale, L I N Y, chorle $763 283, phase I development of the Interim Interceptor $600,000 scale model of airplanes, $54,040

Reynolds Metals Co, 2500 South Third St, Louisville, aluminum sheet, 1,025 000 lb, $419 072

Ribr Aircraft Corp, Chula Vista, Calif, sling 35 ea $25 810

Roth Office Equip, Co. 113 E. Third St, Dayton, weather station equipment, $40 876 drafting machines $42 026

Schaffer Air Industries, Inc, 32-16 11th St, Long Island City, N Y, hydraulic pump assembly 11 ea, $60 067.

Scull Aviation Corp, Lancaster, N Y., regulator & maintenance data 6700 ea., $394 295

Screw Products Corp of America, 6211 Southern Ave, Southgate, Calif, elbow, plug reducer & tee 341,170 ea, $37 800

HARD HITTER

A 40,000-lb drop hammer for production of aircraft and engine parts is one of the facilities in a $4½ million improvement and expansion program recently completed at Kropp Forge Co., Chicago. Other equipment involved includes a 4,000 ton forge press, furnaces for heating to forging temperatures, heat-treatment units, descaling facilities and handling equipment.

K-225 TURBOCOPTER, modified Kaman K-190 rotorcraft, gets its driveshaft power from a Boeing Model 502-2 gas turbine.

Turbines Look Good for Copter Power

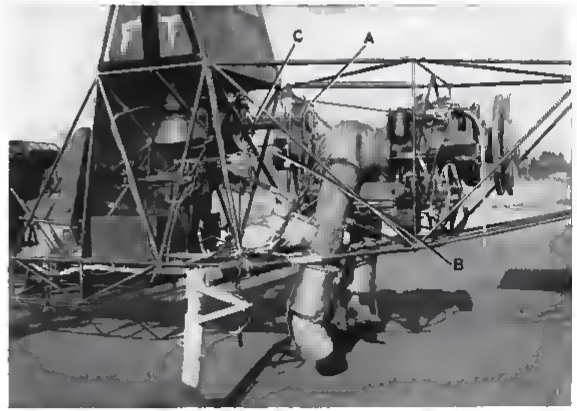
- **Kaman reveals results of K-225 program.**
- **Light weight, great simplicity keynoted.**

A modified Kaman K-225 helicopter, the world's first to receive its driveshaft power from a gas turbine, has recently completed its flight test program.

Powered by a Boeing Model 502-2 gas turbine rated at 190 hp. for take-off, the special turbocopter first flew three months after the receipt of contract from Navy's Bureau of Aeronautics.

Results of the flight test program should furnish a preview of some future phases of helicopter operations, because most experts in the field believe in the gas turbine as the ideal powerplant for tomorrow's rotary-wing craft.

Kaman's experience with the project has been summarized in a report to the industry presented at the recent Eighth Annual Forum of the American Helicopter Society *



BOEING 502-2 gas turbine engine in modified Kaman. Power train drives through intermediate transmission (A) to rotor shaft main transmission. Gas turbine power shaft enters at bottom, is coupled through rubber vibration damper (B) to gear train and power takeoff shaft (C) from transmission. Latter shaft, with two universals, drives into main transmission.

▶ **Out of Compromise**—Frustration led the way to installation of the little Boeing gas turbine in the copter. Kaman engineers were troubled by the necessary compromise between hovering and highspeed efficiencies, or between hovering efficiency and controllability. But because of design complexity, they

* Evaluation of a Kaman Turbo Rotor Helicopter, by John O. Emmerson, Chief Engineer, Kaman Aircraft Corp., and Seth R. Thompson, Formerly Asst. Chief of Research, Kaman Aircraft Corp.

were reluctant to move in with a two speed transmission to allay the difficulties of compromise.

So the first announcements of the Boeing Model 502 gas turbine fell on receptive ears, and subsequent talks between Kaman and Boeing engineers spurred interest in the installation.

Boeing's performance data showed that full shaft horsepower could be obtained from the engine over a wide range of output shaft rpm. And as a bonus, the engine could show an increase in shaft torque as the shaft rpm decreased. This suggested some possible degree of rotor rpm. stabilization to the Kaman crew.

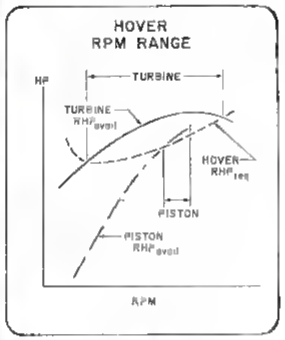
Navy's BuAer awarded an experimental contract to Kaman and the job began. Test ship was a Kaman K-225 owned by the Navy and identical except for engine power to the K-190. In its turbine-powered version the K-225 showed identical power loading—considering losses—to the piston-engine model K-190. This made direct performance comparisons possible.

► **Why a Gas Turbine?**—There are a number of advantages accrued from the installation of the gas turbine in a helicopter and these are commonly recognized throughout the field. Kaman enumerates the benefits of the turbine in this way:

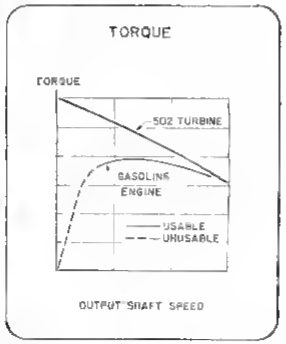
• **Best economy at proper rpm.** Propeller requirements of fixed-wing aircraft have kept engine rpm considerably lower than would be optimum with an engine designed specifically for helicopter use. So the piston engine in a rotary-wing craft must operate near full engine rpm., and at that point its fuel consumption is high. In the gas turbine, high minimum fuel consumption occurs near maximum engine rpm., or just at the desired operating speed point.

This argument is somewhat nullified by the relative high fuel use of the turbine against the relative low consumption of the piston engine, in time, this difference is expected to be lessened.

• **Torque safety.** For any given compressor rpm., the shaft output torque increases as the shaft rpm. decreases. Kaman felt that this torque characteristic plus the effect of the firm's servo flap in partially governing rotor rpm.



HOVER RPM RANGE. Gas turbine vs piston engine power.



TORQUE characteristics as function of output shaft speed. Gas turbine vs. piston engine.

Kaman K-225 Performance* With Boeing 502 Gas Turbine

	Turbine engine of	
	175 hp. (normal rated)	190 hp. (takeoff)
Hovering ceiling at 2 300 lb gross	1 100%	2 300%
Hovering ceiling at 2,500 lb gross	0 for piston power	Good inline performance
Hovering ceiling at 2 300 lb † gross	38%	103%
Hovering ceiling at 2 500 lb gross†	33%	410%
Rate of climb at S L. at 2 300 lb gross	10%	83%
Rate of climb at S L. at 2 500 lb gross	13%	52%
Service ceiling at 2 300 lb	103%	—
Service ceiling at 2 500 lb	95%	—
Absolute ceiling at † 2 300 lb	98%	—
Absolute ceiling at 2 500 lb	91%	—
Maximum forward speed	8%	11%

† Including ground effect. *All other hovering performance is with zero ground effect*

* Figures are based on percentage improvement of performance of Kaman K-225 turbocopter over the Kaman K-100 with piston powerplant. All base data are for piston engine at 180 hp. maximum.

It must be remembered that all comparisons based on percentages only must be looked at carefully. A sharp percentage increase does not necessarily mean a sharp actual increase—a rise from 1 ft. to 2 ft. is a 100% increase but an actual increase of only 1 ft.

might add up to a large improvement in helicopter art

▪ **No clutch.** Since there is no mechanical linkage between the sections of the gas producer section and the turbine section of the Boeing Model 502, this creates, in effect, a fluid coupling. So there's no need for the usual mechanical clutch and its problems.

▪ **No cooling horsepower.** The cooling fan and cowling of the piston engine are eliminated by use of the gas turbine. This reduces empty weight of the craft and eliminates cooling horsepower losses.

▪ **Low noise level.** Kaman says that when the helicopter flies directly at you, there is the impression of a complete lack of engine noise. When the copter passes over and beyond the observer, the high-frequency whine of the compressor does come through the rotor noise. Conversation between front and rear seats is possible without intercom, the pilot can talk with ground personnel in conversational tones during hovering.

▪ **Fuels utility.** Logistically, the turbine shows an advantage because of the variety of fuels which it burns. The list includes all conventional fuels from diesel oil to gasoline with some modifications to the fuel system, propane and natural gas could be used.

▪ **Favorable speed-power characteristics.** Near-rated power can be drawn from the engine at rated compressor speed over a broad range of output shaft speeds. For the test helicopter, the allowable turbine range for hovering rpm on the output shaft was about twice that of the piston engine it replaced.

▶ **Installation Details**—The basic installation problem was an easy one, because the Boeing turbine was smaller all around than the piston engine it was to replace. Kaman's engineers designed a tubular tray integral with the tail cone structure. Removal of four bolts allows both cone and turbine to be lifted out for repair or replacement.

As explained, there was no need for a mechanical clutch in the power train. The turbine output shaft was coupled through a gear transfer case and short driveshaft to the freewheeling unit driving the pinion gear on the rotor shaft transmission.

The transfer case contains two intermeshing spur gears. One is driven by the engine output shaft through a rubber vibration damper and the other is directly connected through a short driveshaft to the main transmission.

Boeing's turbine had been designed with a rotation sense opposite to that standard in aircraft powerplants. So the turbine was installed with the driveshaft facing forward instead of rearward as in the piston-engine installation.

During the installation, the large volume of high-velocity gases available at the turbine exhaust suggested the use of an ejector pump to draw cooling air through oil coolers for the turbine and helicopter transmission. Results, says Kaman, were encouraging.

▶ **Performance Comparison**—Because of the identical characteristics—except for powerplants—of the two versions of the Kaman copters, direct comparison of the performance items reflects only the effects of powerplant change. Both copters ended up with the same gross weight for the comparison, but the turbocopter had the greater useful load because of the reduced weight of the installation.

The reciprocating engine installed weight was 559 lb for the Boeing powerplant, this weight was reduced to 331 lb.

There was one other contributing factor to the improved performance of the turbine-powered version. There were fewer system losses because of the elimination of cooling fan and clutch. This was reflected in about a 7% improvement in rated power.

Presumably definite performance figures remain classified. Thus the table which compares the two sets of items expresses those for the turbine job in terms of percentage improvement over the reciprocating engine version.

▶ **Test Results**—The solution of the installation problems and the successful flight tests of the turbocopter have added to the general store of knowledge now accumulating in the helicopter field. These are some of the qualitative observations forwarded by the Kaman engineers:

▪ **Belief in the gas turbine** as a highly desirable helicopter powerplant has been underscored by this test installation.

▪ **Acceleration and torque** characteristics are impressive.

▪ **Minimum briefing** of pilots is required, assuming that they are already qualified on piston-engined copters.

▪ **Useful load gain** is obtained because of the difference in installed weights of the two powerplants.

▪ **Lower noise level** in comparison to the piston-engined version. Most noise comes from the rotor blades in the turbine model.

▪ **Almost no vibration** remains in the turbine-powered copter.

▪ **Crew comfort is increased** by the two factors mimicdately above. Ordinary conversation between crew, or between crew and ground crew during hovering is possible.

▪ **Fuel consumption** is doubled approximately under operating conditions which draw near-rated power from the engine. Partial compensation is gained here by the lower cost of the turbine fuel and by lessened fire hazard, says Kaman. Not mentioned by the authors is the possibility of engine improvements working to reduce specific fuel consumption.

▪ **Repair time is low** because of relative simplicity and fewer moving parts.

▪ **Ejector pump cooling** is a promising method of oil cooling.

▶ **For Future Studies**—These were not the only results of the BuAer-Kaman program. From the flights came indications of subjects to be studied further and changes which should be made for a new project.

Kaman has recommended a program for further study and evaluation of the gas turbine powerplant. It has been planned to obtain data and experience which will be of value for both research and production of gas turbine copters.

The basic program would start with the installation of a photopanel recorder in the experimental craft, which would be used to record the usual performance parameters.

These basic data would then be used to study such items as control coordination between engine and airframe, control response, fuel control systems—with particular attention to altitude and temperature compensation, and speed governing—and relative merits of first and second stage turbine governing to maintain constant rotor speeds.

And then the utilization of jet assist should be studied along with improved ejector cooling system configurations. Other subjects would include possible contamination of cockpit air, recirculation of exhaust gases through the turbine air intake and noise level inside and out.

Based on this modest program, Kaman stumps for a vigorous plan to develop gas turbines for helicopter applications in several power ranges. The firm further believes that a helicopter powered by gas turbines should be service-evaluated now. —DAA

Solder-Weld Alloy Undergoes Trials

More effective soldering and welding of aluminum is the purpose of an alloy being marketed under the tradename of Chemalloy.

Its application to aircraft is being investigated at the Materials Laboratory, Wright Field, Dayton, and by private industry. The laboratory has authorized the maker, Chemalloy Associates, Santee, Calif., to refer to it contractors who desire to use the metal on Air Force contracts.

Convair is trying the alloy for lap and butt joining on aircraft. Stewart Die Casting Div. of Stewart-Warner Corp., Chicago, is using it experimentally in repair of aluminum die castings. Other experimental purchases have been made by Aeronca Mfg. Corp., Middletown, Ohio, and Bendix Aviation Corp.

In all, 322 firms are experimenting with the metal or using it in limited production applications. There have been about 50 reorders.

The product's developers make these claims for the material: It provides a high-grade joint with complete molecular fusion; it is easily machined and it requires no skill to use. They say it doesn't require a flux and the metal to be joined needs no cleaning or special processing.

Lockheed

STARFIRE NEARLY AUTOMATIC FIGHTER

On the opposite page you see illustrated in action the nearly automatic Lockheed *Starfire* (F-94C). This all-weather jet fighter is an electronics masterpiece with an interesting development history.

The "C" is the third in the *Starfire* series and is now being delivered to the U. S. Air Force to augment squadrons of F-94A's and F-94B's now on 24 hour duty as protection for such key cities as New York and Washington.

The evolution of the *Starfire* actually dates from the spring of 1945, when Lockheed developed America's first operational jet fighter, the F-80 *Shooting Star*. From the F-80 came the T-33 two place jet trainer now used to train 9 out of 10 U. S. jet fighter pilots (also pilots from 9 other nations).

In turn the T-33 was redesigned to incorporate the most advanced electronic equipment known as well as some unknown devices that had to be specially invented. This became the U. S. Air Force's F-94 *Starfire*, now developed to the point where it both flies and fights with more than human accuracy. It has an all-rocket armament—no guns!

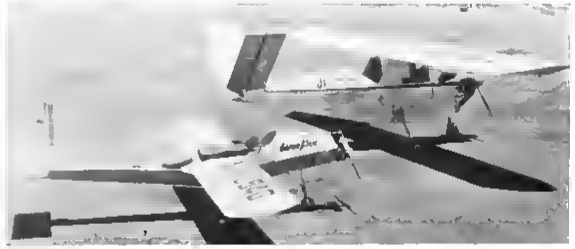
Electronics innovations include the Westinghouse Autopilot and Sperry Zero Reader. It is one of the few fighter-type planes equipped with ILS (instrument landing system) for low visibility landings. *Starfires* pack 1200 pounds of electronics, compared to 168 pounds of radio in the Lockheed P-38 of World War II.

The *Starfire* is the first production aircraft to fly with the new Pratt & Whitney J-48-P-5 jet engine. Its afterburner provides extra power for rapid take-off and extra performance in battle.

The F-94C is the largest of the original Lockheed jet series. The statistics: take off weight, over 20,000 pounds; length, 41 feet, 5 inches; wingspan, 37 feet, 6 inches; height, 13 feet, 7 inches.

A pioneer in the jet field, Lockheed has produced more jet aircraft than any other manufacturer.

HONEY BEE gets off the runway at Montgomery Field, San Diego, for its first flight July 12. Plane is powered with 65 hp. engine, does 120 mph. straight and level.



BEECRAFT'S BEE CRAFTS pose prettily for their picture. Wee Bee is one of the world's smallest airplanes, is flown from prone position. Production of bigger Honey Bee is expected to start sometime next year.

New Midget Plane Being Tested

The Honey Bee is an all metal single-place lightplane wrapped up in a compact design. But only final performance and flyaway price will determine whether it qualifies as one of the good things which are said to come in small packages.

Right now Honey Bee—designed and developed at Beecraft Associates, Inc., San Diego—is undergoing flight tests preparatory to application for an Approved Type Certificate.

With that step out of the way, a demonstration tour of the little plane will play the airport circuit throughout the western United States. Plans call for production to begin after the tour. Beecraft hopes to start building the planes in quantity sometime next year.

▶ **The Package**—Honey Bee weighs in at 550 lb.—presumably empty weight—and is powered by a 65 hp. engine. The high wing spans 28 ft. and overall length is 17 ft.

A butterfly tail has been specified by the designers as a cost-reduction measure.

Construction of the Honey Bee is conventional; stressed skin design is used throughout. A spring steel tricycle landing gear is used, with hydraulic brakes in the main gear and a steerable nose wheel.

The fuselage is slab sided, its contours break around the wing to give a "control tower" type of cockpit. From this position visibility in all directions is exceptional.

No flaps are fitted, but if operators want to meet special requirements they will be able to buy flap kits as well as kits for full span slots and trim controls.

If the prospective purchaser already has a surplus 65 hp. engine, Beecraft will install it in the Honey Bee airframe. According to a survey of aircraft operators, there is currently a surplus of such engines which have outlived their original airframes.

▶ **The Performance**—Preliminary flight tests have produced some data on performance. First flight of the Honey Bee was of 20 min. duration and two other flights followed to bring the day's total to 1 hr. 25 min.

Takeoff speed was about 45 mph. and distance to unstick was about 500 ft. Climb to cruise altitude was at the rate of about 1,100 fpm. and cruising speed was 110 mph. at 2,150 engine rpm.

Top speed straight and level was measured at 120 mph. With power on, stall speeds down to 35 mph. were reached. Stall characteristics were good both with and without power, direc-

tional and lateral control held through the stall itself

Dynamic stability about all three axes was dead beat, static stability was positive. In full rudder slips, control forces were well proportioned. During spiral stability checks the airplane showed no tendency to become divergent

▶ **The Background**—Founders of Beecraft previously have designed and built one of the world's smallest airplanes, Wee Bee, a prone piloted single place aircraft. The objective in designing Honey Bee was to get a small airplane which could sell at a low price. William Chana, Beecraft's president, said that with such a plane available, pilots could continue flying for proficiency, business or pleasure at minimum cost. He thought that Honey Bee would also fill the bill for border, forestry, oil line and wire patrols. Other uses could include camera work, police operations and military liaison.

Beecraft was organized by a group of aeronautical engineers, technicians and pilots. In design stages on the company's boards are a one man helicopter, a target drone, a medium range twin engine light cargo or passenger aircraft, and a small deltawing jet research craft designed to carry unit prone position development work.

GE Device Controls Windtunnel Moisture

The control of moisture content inside a supersonic windtunnel is an important job. It is being handled at one of the NACA tunnels by a General Electric dewpoint recorder having a high degree of accuracy.

Mounted in the 4 x 4 ft supersonic pressure tunnel at Langley Field, Va., the recorder automatically measures and records dewpoint temperature of the circulating air.

▶ **Reason For Control**—Moisture in the air inside a tunnel causes flow disturbances when it condenses out of the air.

This happens after a rapid expansion of the compressed air used to drive these tunnels, when temperatures may drop lower than minus 100F.

The solutions are several, and the one chosen by NACA for this tunnel is to bleed dry air into the tunnel circuit. The amount of this air is determined by the readings of the dewpoint recorder.

▶ **Unit Description**—GE's dewpoint recorder monitors the moisture content with an accuracy of five degrees at minus 90F. The unit is mounted in a single steel cabinet and includes a temperature recorder, gas chamber, refrigeration unit, controls, light source and phototubes.

Air drawn from the windtunnel passes through the gas chamber and over a refrigerated mirror located in a phototube system. A dew spot forms on the mirror from the moisture condensed out of the air. This reduces the amount of light reflected by the mirror and measured by the phototubes.

Then the refrigeration is regulated to maintain the mirror temperature to a value which permits a dew spot to form but not to grow. This is the dewpoint temperature, and is transmitted to the recorder by a thermocouple mounted on the mirror.

Toledo U to Teach Tool Engineering

Toledo University has started a four-year course in tool engineering.

Open to high school graduates, the course is one of many being offered by colleges and universities to ease the shortage of trained production engineers.

A certificate of Associate in Industrial Science will be given after four years of night classes. Forty-three of the 56 credit hours can be applied toward an engineering degree. American Society of Tool Engineers helped develop the course, which starts this fall.

New British Jet Unique, but Not Matchless

First photos of Britain's latest challenge to U.S. air supremacy, the multicolored multiplace X-100 jet aircraft, have been released just in time for the pre-Farnborough propaganda buildup.

Considered to be in the convertiplane category, the X-100 combines direct rotor lift and jet propulsion in a unique amphibious airframe.

The jet engine is claimed to embody almost unknown principles. It uses a centrifugal anti-static energizer whose rotary condensers pass between electromag nets and charge pith-balls with alternate negative and positive currents. The pith-balls then become confused and run violently up and down static collector rods. Thus motion builds up a potentially powerful potential in a semi atomic, fully-syphonic closed circuit using specially lightened heavy water.

A single Rato unit, slung forward under the hull, utilizes an expendable ignition system, composed mainly of ordinary phosphor matches.

An auxiliary engine is mounted in the hull. This powerplant is a crankless combination beam engine which provides propulsion for either sea or air. The walking beams are surmounted by four gas-filled copper spheres which rise and fall gracefully under the influence of the engines. Armament is one forward-firing cannon of exceptional bore and destructive power.

Designer of the craft, which bears the full designation of Shell-Bi-Plane X-100, is Emett who has an international reputation as an industrial designer. Emett's work has included the complete design of rolling stock and locomotives for the Far Tottering and Oyster Creek Railway. He could be considered the British counterpart of the equally famed American designer, Mr. Rube Goldberg.

Ceramic Coat Can Protect Molybdenum

Effective laboratory use of ceramic coatings to prevent rapid oxidation of molybdenum and the absorption of carbon by stainless steels recently has been announced by the National Bureau of Standards.

These results are part of a continuing study for the development of ceramic coatings at the bureau. Sponsor of the program is the National Advisory Committee for Aeronautics.

▶ **Molybdenum Protection**—Molybdenum has a high melting point (4,750F) which suggests its use in jet engines. But coupled with that desirable quality is the deterring characteristic that the metal oxidizes rapidly.

So the bureau has been experimenting with a coating made of chromium and glass (frit). Various coatings were bonded to specimens of molybdenum, then submitted to oxidation tests under tension at 1,500F to 1,800F and to flame tests in the region from 2,000F to 3,000F.

In the lower temperature range, specimens stood up under load for 1,000 to 3,000 hr. At 2,800F with no applied load it was possible to achieve protection for as long as seven hours, which is considered sufficient for some applications.

▶ **Carbon Absorption**—Failures of aircraft engine exhaust systems can result from precipitation of carbides near grain boundaries in the metal. This precipitation is the direct effect of absorption of carbon by the steel under severe operating conditions.

NBS tested three types of 18-8 stainless: AISI 304, 321 and 347. Specimens were coated with several NBS coatings, including A-417 and A-19H. Comparison samples were exposed to strong carburizing conditions at 1,350F, 1,500F and 1,650F.

Coating A-19H proved most effective in preventing carbon absorption under all test conditions. But the bureau adds that test conditions were much more severe than actual practice might be, and any of the several coatings might well prove satisfactory in service.

AVIONICS

To Make Better Turret Gunners

B-50 and B-36 remote turret gunners can be trained on the ground, and their performance can be closely scored on a new T-13 gunnery trainer developed by Glenn L. Martin for the USAF. The student gunner sits under a sighting blister and uses a regular B-50 or B-36 sighting station to track the image of an attacking fighter projected on a large half dome. In many respects the trainer is superior to an in-air gunnery practice since it gives permanent record of gunner's tracking errors (in azimuth and elevation) and his ranging errors. Other instruments on the instructor's panel show length of time the gunner was on target and correlate this with operation of his trigger to compute, and show, how many hits have been scored. A magnetic tape recorder unit controls the movement and apparent range of the target image, giving a large variety of different simulated attacks.

FILTER CENTER

▶ **Braniff Unable to Get APS-42s**—Braniff Airways is still unsuccessful in its attempts to buy or borrow several APS-42s for experimental use on its South American routes. USAF and Navy have reportedly turned Braniff down because they are reluctant to leave APS-42 unguarded even for brief en-route stop-overs outside the U. S. The equipment itself is still considered classified.

▶ **Hughes Continues to Grow**—Hughes Aircraft Co. now has almost 1,000 engineers and scientists engaged in avionics research and development, exclusive of those in design and manufacturing activities. More than 50% of those in research and development have masters degrees; about 10% are PhDs.

▶ **M-H to Stabilize Helicopters**—Minneapolis-Honeywell has entered the helicopter autopilot field with a $4.5-million contract from the USAF to provide three-axis stabilization of the Piasecki H-21. Autopilot is expected to permit accurate hovering control, thereby increasing usefulness of helicopter for rescue and other military tasks.

M-H says new autopilot will use three rate-type gyros to measure angular rate about roll, yaw, and pitch axes, in addition to a conventional vertical gyro. Autopilot's three electronic amplifiers are reported to be miniaturized to reduce system weight.

▶ **Automatic GCA Under Test**—Gilfillan's automatic GCA (precision approach radar) is currently under test at Eglin AFB. In addition to conventional talk-down feature, the new radar will provide ILS-type signals in the cockpit for plane's automatic approach coupler, Zero Reader type flight director, or cross-pointer indicator.

▶ **F-5s Aid F-84G Pacific Hop**—Lear F-5 autopilots were used in the seven lead planes in the recent F-84G mass refueling flight to the Orient. Thanks to autopilot stabilization, lead planes could use celestial navigation for position fixes. Lear says no URs (unsatisfactory reports) were received.

AIRSTREAM DIRECTION INDICATOR consists of slotted probe (left), relay box (center) and cockpit indicator (right). System weight is under 6 lb.

Navy Buys Angle-of-Attack Unit

Device going into new fighters can increase range by telling pilot when he is at most economical attitude.

An angle-of-attack indicator going into several new Navy fighters may eventually find commercial application as a means of improving cruise control procedures.

The device—the Airstream Direction Indicator, produced by Specialties, Inc., Syosset, L. I., N. Y.—not only tells the pilot when he is flying at the most economical angle of attack, but offers a safety feature in its ability to warn against stalls.

Prime aircraft production orders for the indicator have been received for the Grumman F9F-5 and -6, McDonnell F2H-3, North American FJ-2, and Chance Vought F7U-3, according to the manufacturer. Development was undertaken originally under Navy BuOrd sponsorship.

Operation of the indicator depends on detection of differential pressure caused by changes in direction of airflow around a probe. Accuracy of 1/10 deg. and a fast time response are claimed. Time constants are 0.20 sec. at Mach 0.10, 0.07 sec. at Mach 0.15, 0.023 sec. at Mach 0.34, and 0.014 sec. at Mach 3.0. Weight of the system is less than 6 lb.

When the probe is located horizontally, the indicator functions as an angle-of-attack device, mounted vertically, it may be used as a sideslip indicator.

▶ **What It Does**—Here is what Type S3 Angle of Attack System provides:

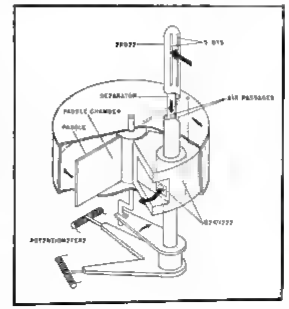
• **Continuous indication** of the angle of attack of a plane in flight. Angle is presented on a 2½-in. dia. integrally lighted instrument in the cockpit, graded from 0-30.

• **Stall warning.** Electrical signals actuate any type of stall warning mechanism (light, horn or stick shaker) at a predetermined angle of attack.

• **Impulses to energize** colored lights on wing of the plane. Purpose is to tell an aircraft carrier's landing signal officer whether the plane is coming in too hot (green light), at correct speed (amber light) or too slow (red light).

▶ **What It Is**—The Airstream Detection System consists of three components: Airstream direction detector, a relay unit, and an indicator unit.

• **Airstream direction detector.** A ⅜-in. dia. round metal probe 3 in. long protrudes into the airstream. In its forward face are milled two parallel slots to detect differential airflow pressures. Pressure from each slot is transmitted to the sides of a paddle in a paddle chamber at the base of the probe. Changes in pressure cause the paddle to move until the pressure differential is reduced to zero. The moving paddle rotates the probe until this point is reached. Also, through a mechanical linkage, two electrically separate potentiometer wiper arms rotate with the probe and provide source for signals to the cockpit indicator and wing lights.



Airstream Direction Detector

Body of the probe includes two heaters. One, thermostatically controlled, eliminates condensation. The other, a 60-w. heating element, serves as a deicer. Windtunnel tests indicate that the probe will operate satisfactorily up to Mach 3, according to the manufacturer.

• **Relay unit.** Focal point of the system's electrical cabling, the relay unit encloses polarized and power relays, wing light relays, the probe heater circuit breaker, and additional electrical components.

• **Indicator unit.** Mounted on the instrument panel, the indicator has a pointer to give the plane's angle of attack, and a movable bug. The pilot can set the bug to any point on the scale, to indicate the aircraft's stall point, desirable approach speed, optimum cruise condition or any other value desired.

In the body of the indicator a servo motor drives the pointer and cams. Cams actuate switches to the stall warning indicator and wing lights.

▶ **Indicator Adjustments**—These adjustments may be made on the indicator unit:

• **Angular setting** of the dial may be adjusted ±1 deg. to take care of variations in aircraft zero lift angles of attack due to manufacturing tolerances.

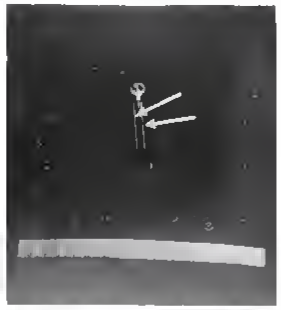
• **Stall warning** and wing light position switches may be adjusted to operate at desired settings.

▶ **Electrical Servo System**—Here is how the electrical system works:

When wipers on two potentiometers are not in electrically equivalent positions a voltage exists between them and current flows through a polarized, sensitive relay to pick up or drop out the power relay, depending on the direction of current flow.

Servo motor drives the indicator unit potentiometer wiper to a position of balance.

To have a highly sensitive, suitably damped system, voltage to the servo motor is fed back through an inductance to a second winding on the sensitive relay to buck the signal on the first winding. Combination of inductance and fixed resistance pulses relays at a frequency of about 18-20 cps. in the balance position. The servo motor oscil-



INLET SLOTS (arrows) detect differential airflow pressures

lates slightly about the null point.

Any small or slow change in the position of the wiper on the transmitter potentiometer increases the time the relay spends in one position and decreases time spent in the other. Result is that servo motors drives indicator unit wiper to the balance position. "For a large change of transmitter wiper position, the pulsing ceases and the servo motor runs at maximum speed until it nears new balance position. As this position is approached, relays resume pulsing, the motor decelerates and resumes oscillation."

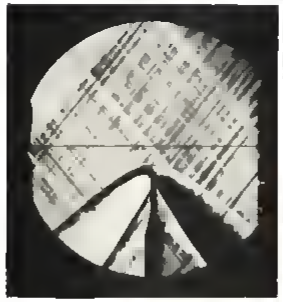
Power is supplied from the aircraft's 27.5 v. system.

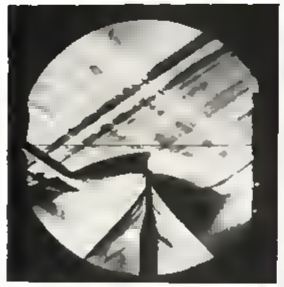
▶ **Mounting**—On most jet fighters, mounting on the side of the fuselage is satisfactory. The probe measures only local airflow. Detector should be placed so that it is relatively undisturbed by 5-deg. sideslip and should be within ±5 deg. of horizontal and normal to the local skin contour. Tufting a proposed area for probe installation is a good idea. If the tufts flutter badly, probe should be located elsewhere.

Two types of mounting are provided, one for removing the instrument from the outside, the other from inside the plane. Unit is built to withstand 5 psi pressure differential if installed in pressurized portions of an aircraft.

For original installation, a mounting plate is secured to the fuselage at an appropriate spot and airstream direction detector is attached.

Test flights, conducted at 5,000 ft. in still air, allow test crews to adjust the probe so that when the angle of attack is in either extreme position (stall or V_{max}) the indicator pointer does not ride off the scale. Also, the two extreme readings should be equidistant from ends of the graduated scale. Probe should be adjusted after each flight until these two requirements have been met. Detector unit then is doweled into position on the mounting plate. This doweled position is used for





SHLIEREN PHOTOS of probe in wind-tunnel. Top one is at higher Mach no.

all subsequent mountings in airplanes of the same model.

▶ **Specialties' Products**—Practically all of Specialties' production is airborne equipment, and 100% of it is military. Among its products:

▪ **Aircraft fire control systems.** Company holds research and development contracts for these.

▪ **Automatic exposure control for aerial cameras.** The photoelectric cell-controlled avionic system controls both the camera's iris opening and shutter speed (or slit opening in the case of continuous strip cameras). This is important in highspeed, low-level photography where light intensities may vary quickly. Unit has extremely rapid response to lighting conditions, according to the manufacturer who holds development and production contracts for this system.

Besides these and the angle of attack system, the company manufactures many types of electrical components (potentiometers, magnetic amplifiers, transformers, etc.) on a subcontract basis for such concerns as Sperry, Lear and Minneapolis-Honeywell.

▶ **Past History**—The Syosset firm found itself in an unusual position after the last war. J. C. Slocum, secretary, told AVIATION WEEK that while most companies' contracts fell in the postwar period, Specialties, Inc.'s total con

tractual commitments increased. Contracts were primarily for research and development. Slocum said that the company was the first to get a Naval Ordnance Development Award during World War II.

Specialties employs 350, does a $3 million yearly gross. It is headed by Stephen A. McClellan (who, incidentally, holds pilot's license #21).

The firm places great emphasis on training programs. Currently it offers a 4-year apprenticeship training program on engineering subjects. An International Correspondence School course is furnished its employes by the firm. Over 50% of Specialties' present foremen are graduates of the course.

Specialties, Inc., has opened a second plant at Charlottesville, Va., to take care of rapidly expanding business. There the firm may avail itself of test and research facilities at the University of Virginia.

It is employing many college students on a part time basis.

OFF THE LINE

The boys flying jet fighters in Korea like their planes, whether F-80, 84, -86, or -94. And one of the performance characteristics that pleases them, especially if they run out of fuel, is the excellent gliding property of the planes. Clean lines of the jets reduce drag sufficiently to maintain a high lift-drag ratio. This is the order of the jets' gliding ability, as listed by the men who fly them: F-84 leads off, closely followed by the F-80 and F-86. The radar laden F-94 trails the list. And the flyboys add that the jets glide better with tiptanks on than off.

The human element plays unpredictable tricks on aircraft flying the long and tedious haul across the Pacific. Companies flying the Pacific Airlift found that rarely do mechanical malfunctions develop at such barren bases as Midway or Wake Island. But when the planes wing their way into such lush paradises as Hawaii, they often become infested with all manner of excessive mag drops, staticky radios and erratic instruments, etc., necessitating maintenance delays during which the crew heads for town. Not the rule, of course, but it happens.

A 9,000x150-ft. concrete runway in Korea was recently swept clean by one man in two 12 hour shifts. Machine used was a Wayne motorized sweeper.

Fischer & Porter Flowrators have found their way to the Philippines. Many different sizes are used to measure liquid flow rates in Philippine Air Lines' overhaul shops in Manila.

Idlewild Gets New Fire-Fighting Systems

Fire-fighting equipment capable of pumping 34,000 gpm. has been installed in a new pumping station at New York International Airport, Idlewild, L. I.

Half the new battery of ten centrifugal pumps are driven by Diesel engines, the other half by electric motors. Emergency power is available to run the electric motors in case of electrical power failure. The Port of New York Authority says the system has enough capacity to fight simultaneously two separated fires large enough to require wide open deluge systems.

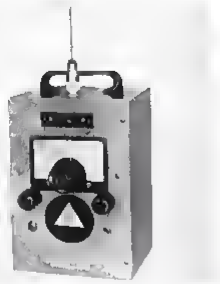
Air Fresheners Go on AAA Fleet

Odorout, a walnut-sized ultra-violet ray lamp, is being installed under passenger seats on All American Airways' fleet of DC 3s, according to Westinghouse, manufacturer of the lamp. Odorout has been used to generate ozone for odor removal in AAA's planes' toilets for a long time. Lamps in new installation will serve double duty as night lights. Aviation Mart Co., Alexandria, Va., designed fixtures to adapt the lamp to the aircraft's 24-v. dc electrical system.

NON-TYING JACKET

There are no strings attached to this reversible life jacket for airline passengers—an ideal finally realized—so the inexperienced should be able to get into it with maximum speed and minimum confusion. Complicated straps on earlier "Mae Wests" often caused extraordinary delays—in one actual flight emergency, passengers still were getting into them 20 min. after alarm sounded despite professional coaching of crew, it is reported. New jacket, though non tying, is said to give snug fit, keep head safely out of water. Developed by John F. Aveller, Pan American World Airways engineer, it will be produced by Air Cruises, Inc., Clifton, N. J.

NEW AVIATION PRODUCTS



Two-Way Radio Set Weighs Only 7 Lb.

Of interest to private pilots is a new sending and receiving radio set that weighs only 7 lb and has a range up to 40 miles The Civil Air Patrol has expressed interest in the unit for air-to-air and air-to-ground communication

The unit was developed by engineers of the Deltronic Co of Los Angeles to armed forces specifications primarily for use on the ground But the firm believes that with slight adaptation it also can serve aviation

The self-contained set can be plugged into an ordinary 110 v receptacle or into the cigar lighter of an automobile, the company claims The unit measures 6¼x6x9½ in. and is equipped with a 19 in whip antenna It contains a complete line isolated power supply and vibrator, a builtin noise limiter and crystal-controlled transmitter using miniature tubes Its 2-meter band is calibrated for 143 8 to 148.1 mc. Announcement of other models is expected soon

Deltronic Co., 9010 Bellanca Ave., Los Angeles 45, Calif

Simpler Greasing

A big saving in manhours taken to lubricate shielded bearings in aircraft can be realized by using new adaptors designed to fit any grease gun, says E Z Lub Mfg. Co

The firm is offering a lubricating and cleaning kit containing three adaptors to cover the standard range of shielded bearing sizes They eliminate, in many cases, the need for removing the bearings from the aircraft for servicing Wherever one side of the bearing is accessible, the adaptor will service it," says E-Z-Lub They can be attached to grease guns that are either manually or air-operated, stationary or portable. Mechanic merely holds adaptor head against exposed side of bearing and applies lube pressure Special adaptors can be obtained for particularly inaccessible bearings and those outsize ones with axle holes larger than ¾ in A single operator, claims the company, can lube 20 to 30 shielded bearings per minute on a stationary setup using the new fittings

E-Z Lub Mfg Co, Glendale, Calif

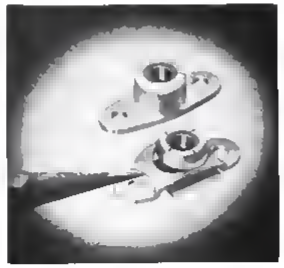
Fuel Control

A new solenoid has its electrical receptacle mounted on the side so it can be fitted in a long narrow space to actuate aircraft fuel level control valve mechanisms.

The unit has an over-all height of 1⅜ in, weighs ¾ lb, is built to specifications listed in MIL 4040. It is being supplied to a large valve manufacturer who has developed a new single-point refueling system for commercial and military aircraft, the maker says The solenoid has ¼-in stroke giving a 2 lb pull at 18 v. d.c, can be used at temperatures up to 300F

The manufacturer specializes in solenoid and valve designs for aircraft and guided missiles

Lafayette Engineering and Development Co, 9675 Santa Monica Blvd, Beverly Hills, Calif



Floating Nut Is Reduced in Size

A two-piece floating anchor nut has been announced by Elastic Stop Nut Corp for aircraft fastener installations

Older floating anchors couldn't be used in places such as wingtips, the company claims, because they were too big So the smaller solid anchor nut had to be employed But, according to Esna, this meant lineup of nuts had to be extremely accurate, since solid anchors can't float off center to pick up bolts in misaligned holes. This slows factory installation and boosts costs

Esna says it has licked the problem by putting its outsize floating anchor nuts on a reducing program, redesigning and slimming them down to the same size as the one-piece nut while still retaining the floating feature

By thus cutting off the fat and leaving the muscle, a nut was made that's reportedly just as strong as stationary anchors, complying to AN 366 dimensional and performance requirements

The new nuts offer the triple advantage of being

- **Lighter in weight** than former floating anchors (by 1 3 lb per thousand)
- **Cheaper to install than** non-floating types by permitting looser tolerances and speedier installation (by 3 cents to 4 cents per unit, says Esna)
- Better for inventory purposes, since they permit standardization on one item.

Several other fastener manufacturers have developed similar compact floating anchor nuts in place of solid anchors

Elastic Stop Nut Corp of America, 2330 Vauxhall Rd, Union, N. J.

ALSO ON THE MARKET

New approach in sandpapers, Gritcloth, is claimed to last ten to 15 times longer than old type Removed stock quickly clogs abrasive in solid-blacked paper because it has nowhere to go Gritcloth solves this by imbedding abrasive in tough open mesh fabric that lets particles flow through holes, according to developer, Bay State Abrasive Products Co., Westboro, Mass.

Bellows rated for 3,600 psi., made of stainless steel, are being produced by Clifford Mfg Co for equipment which was limited in operation because of lack of suitable bellows Typical o.d. of units of this pressure rating is ⅞ in Clifford Mfg Co, Waltham, Mass

Coupling for pneumatic line connects or disconnects instantly simply by pushing, but is said to be securely locked when connected Part has swivel action at the joint and automatically shuts off air when uncoupled Nelson Specialty Corp, San Leandro, Calif

Precleaner for steel to be deep drawn or extruded removes oil, grease and other foreign matter from ferrous parts Besides high wetting and penetrating properties, the product, Detrex 61, is free-rinsing, according to maker, Detrex Corp, Detroit 32, Mich.

FINANCIAL

Trust Holdings of Aviation Equities

(as of Dec. 31, 1951)

AIRCRAFT

Company	Shares Owned	Number of Trusts
Beech	18,200	2
Bell	284,300	3
Boeing	25,000	10
Consolidated-Vultee	480,300	8
Curtiss-Wright—Common	22,800	4
Curtiss-Wright—"A"	38,600	7
Douglas	87,900	34
Fairchild	28,300	2
Grumman	101,300	14
Lockheed	130,100	16
Martin	2,400	1
North American	176,900	13
Republic	27,700	3
United Aircraft—Common	273,400	30
United Aircraft—Preferred	20,900	10

AIRLINES

American—Common	244,200	33
American—Preferred	40,800	13
Braniff Airways	74,400	5
Capital	8,400	2
Chicago & Southern	21,400	2
Delta	20,500	2
Eastern	150,200	20
National	142,400	8
Northeast—Common	202,700	1
Northeast—Preferred	420,800	1
Northwest—Common	83,200	4
Northwest—Preferred	4,100	2
Pan American	87,700	10
TWA	13,400	3
United Air Lines—Common	158,000	27
United Air Lines—Preferred	4,000	4
Western	8,000	1

Trusts Shift Air Equities Balance

Trend has been to liquidation of airline shares and purchase of aircraft stocks since the start of 1952.

Investment trusts have been liquidating their airline equities while increasing their aircraft stock holdings since the start of 1952. This is highlighted by the semi-annual report of National Aviation Corp., the largest of the trusts devoted solely to aviation interests.

The table above summarizes an exclusive AVIATION WEEK survey of about 200 general trusts, showing total holdings and the number of funds owning shares in specific companies as of Dec. 31, 1951.

▶ **National's Balance**—During the first half of the year, National Aviation sold 17,500 shares of American Airlines common, 15,000 Braniff, 3,000 Delta, 12,500 Eastern, 9,000 TWA, and 31,900 United common. The only airline securities acquired were 2,300 shares of United preferred, 76,000 of Mid Continent debentures, 1,000 shares of Chicago & Southern and 2,500 shares of New York Airways, Inc.

On the other hand, while this selling in airline equities was taking place, National Aviation added to its position in aircraft securities. The principal acquisitions included 3,000 Grumman, 2,000 Lockheed, 3,500 Republic, and 2,500 United Aircraft common. A total of $250,000 in debentures of the Glenn L. Martin Co. was also purchased.

The airline portfolio which represented 52.2% of the trust's total portfolio at Dec. 31, 1951 was reduced to 32.1% at June 30, 1952. During the same period aircraft holding increased from 42.7% to 56.7%.

At June 30, 1952, National Aviation's airline portfolio, with a total cost of $2,902,056, had a market value of $3,298,075. The aircraft group, however, with a total cost of $3,889,690, enjoyed a market valuation of $5,762,100.

▶ **Large Holdings**—In a number of instances individual large blocks, frequently carrying control, are owned by separate funds.

• **First York Corp.** owns 213,900 Bell shares.

• **Atlas Corp.** owns 426,800 shares of Convair stock. This trust also controls Northeast, owning 392,700 of the common and 429,600 of the preferred.

• **Investors Mutual** owns 100,000 shares of National, although no control is involved. This was the stock acquired from the airline and represents the shares first purchased by the carrier from W. R. Grace & Co. last year.

The tabulation reveals that, among the aircraft group, United Aircraft is the most popular, held by a total of 38 trusts. This holding also represents the largest aggregate dollar investment in the aircraft group by the trusts.

Among the airlines, United, Eastern and American were clearly among the most favored holdings of the trusts.

▶ **Important Changes**—There have been a number of significant changes since the first of the year in the portfolios of the general investment trusts concerning their aviation holdings.

For example, for the first quarter ended Mar. 31, 1952 four trusts bought a total of 8,500 Grumman, five acquired 9,000 Lockheed, two purchased 13,000 North American, and two added 5,700 McDonnell. However, three of the six trusts who traded United Aircraft common were responsible for 12,600 shares being sold on balance. Similarly of the seven funds with transactions in Douglas, the pressure of two trusts was sufficient to result in a net decrease of 5,600 shares.

The selling pressure in airlines was apparent during the first quarter. Of ten funds acting, six were sellers and accounted for a net decline of 11,900 shares of United Air Lines common. One fund sold 5,000 shares of National. Another fund disposed of 2,500 Delta. A total of 8,300 shares of Braniff were liquidated by two trusts. Of seven funds involved, two were sellers and accounted for a net decline of 2,000 shares in the Eastern position.

General investment trusts are becoming an increasingly important source for equity capital to industry. The aviation groups, particularly the airlines, in need of larger amounts of capital could be helped considerably if they could tap the general investment trusts. Recent exoeriences, however, indicate that investment trust funds as a whole do not regard the airline group very favorably.

—Selig Altschul

North American Airlines Group

Lewin — Fischgrund — Weiss — Hart

CONTROL

North American Air Coach System	advertises and sells tickets as North American Airlines Agency
Republic Air Coach System	handles accounting and ground service
Trans National Airlines	flies passengers
Trans American Airways	flies passengers
North American Airlines	flies passengers and furnishes flight personnel for all three airlines
California Aircraft Co	owns and leases aircraft
Twentieth Century Aircraft Co	owns and leases aircraft

Bid for Certificate Based on Size

With combined revenues nearing $10 million annually, nonsked coach group merges to seek new status.

North American Air Coach System—a $10-million nonscheduled aircoach operation—has asked the Civil Aeronautics Board to approve a merger with six other companies that the carrier hopes will pave the way for a regular airline certificate.

The six companies are:

- **North American Airlines, Trans National Airlines, Trans American Airways—the operating companies,**
- **Republic Air Coach System**—the ground servicing and accounting firm.
- **California Aircraft Co., Twentieth Century Aircraft Co.**—the firms which own the aircraft.

At present, all of these are tied together by a series of contracts. Sales activity for all is carried on by North American Air Coach System, also known as North American Airlines Agency.

▶**Bid by Biggest**—If the merger is approved, the surviving company would be North American Airlines. With all of the companies under one corporate tent, the airline believes it can make a good case before CAB as the largest and most solvent contender for a regular air coach certificate.

One or more nonsked airlines may get such a certificate as the result of the Board's "Investigation of Air Services by Large Irregular Carriers," slated to begin Sept. 3.

But if they do, it will be over the bitter protests of the certificated passenger carriers. As an indication of what may come, American Airlines already has filed with CAB an exhibit titled "North American Airlines: A Case History in Circumvention of Law and Lawful Regulation." This allegation refers to the fact that some nonskeds previously owned by or connected with the owners of North American Air Coach System had their registrations revoked by CAB for flying too often.

This has not happened to the present North American Air Coach System. The contractual relationships within the group have been so carefully put together that no CAB enforcement proceeding has ever been brought against the present merger applicants. These contracts allow the carriers to operate within CAB's flight frequency limits for individual nonskeds and pile up surprising financial results.

▶**Sales Approach**—Those results have rested on an aggressive sales campaign that has left few outlets untapped. North American's management stepped into the aircoach field very early after the war. By this time they have probably more experience in the aggregate than any other nonsked coach group.

The sales campaign has been featured by intensive radio advertising on disc-jockey shows with an offer to deliver tickets free of charge following telephoned order, giant neon signs, more space in classified sections of telephone directories than any other line. All the advertising, in other words, was directed right at the low-budget travel market.

North American believes its sales account for nearly one-third of all domestic, nonsked common-carriage air coach business. It has 21 sales offices. Offices in cities not on NA's trunk routes buy the customer a ticket via scheduled airline to a connecting point.

Revenue passenger miles flown now rival Western Air Lines: they exceed those of Colonial and Northeast together; and they exceed those of Continental, Mid-Continent or Chicago & Southern individually.

The North American executive offices at Burbank Air Terminal, Calif., are as attractive and substantial looking as those of any domestic airline. The New York sales office appears to outshine them all. Customer service in the form of ticketing, ramp and flight attendant courtesy and efficiency appears equal to coach service rendered by any competitor.

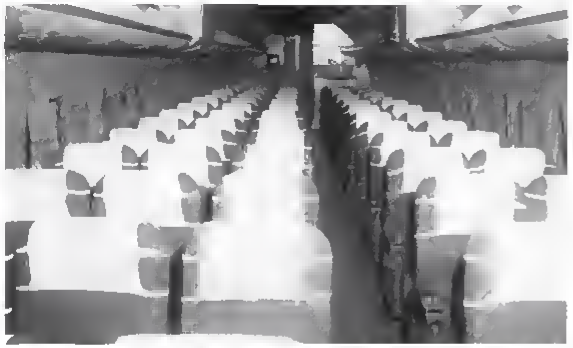
The companies fly jam-packed (79 passenger) DC-4s in competition with the faster less-crowded DC-6 and Connie coaches of American, National and TWA as well as the DC-4 coaches of other airlines.

Yet, sales and load factors have risen even higher this year—even though certificated competitors cut coach fares and increased coach schedules this winter and spring to meet nonsked competition.

▶**Equipment**—One of the merger group, Twentieth Century Aircraft Co., bought a fifth DC-4 last month, after losing out in bidding for Slick Airway's prototype DC-6A. This DC-4 is now being fitted with aft-facing seats.

The carriers also operate DC-3s on shorter hauls and as extra sections on long hauls. The DC-3s and a Lodestar are owned by Standard Airlines—a non-operating company belonging to partners of North American. Standard is not an applicant in this merger.

Negotiations with both Douglas and Lockheed to buy four new DC-6As or Super Constellations have been delayed by financing difficulties because of un-



SEAT PACKED DC-4, which seats 79, gives North American incentive to push sales

certainty about CAB policy toward independent airlines

Flying Tiger Line does the DC-4 overhaul and maintenance, the companies do the rest

▶ **The Merger Application**—The CAB application proposes merger of the seven companies because they 'could better perform any air transportation which may be authorized in the pending investigation (Docket 5132) than could any one of the named large irregular carriers (and) many of the problems which have faced the Board arising out of irregular carrier operations would be solved if there were somewhat fewer large irregular carriers, each or most of them being somewhat larger, and financially more sound than many of them have been in the past"

"This position is supported by the Sparkman Report" North American states alluding to the favorable stand taken on bigger nonsked operations and mergers in a report by Sen. John Sparkman's Small Business Committee

The merger application proposed only one class of stock for the consolidated company—10 million common shares $1 par value with equal voting rights

▶ **Financial**—You can judge the size of the system from the consolidated financial statement submitted with the merger application Net operating profit last year topped $1 million, with revenues of nearly $7 million For the fiscal year ended this June revenues approached $10 million And calendar year 1952 may show further gains revenues are running over $1 million a month now

Here are highlights of the statement

• **Profit** before income taxes in calendar 1951 was $1,158,438 on revenues of $6,693 350—of which fares accounted for $6 001,605, charter and commission income $623,528, excess baggage $43,282 plane lease $17,400 and miscellaneous $7 535

• **Operating expenses** break down as follows salaries of flight and operations personnel $431,752, maintenance $634,068 gas and oil $794 145, plane rental $182,906, plane depreciation $264,956, insurance $108,751, food $73,215, per diem pay flight personnel $77,166, landing fees $48,667, phone and wire $43,958, travel flight personnel $12,786, baggage handling $28,150; passenger service $36,250, plane supplies $16,177, and other items $34,232

• **Selling expense** was $2,297,200, administrative $408,643 and other expense $41,890—making grand total expenses $5,534,913

• **Total assets** Dec 31, 1951 were $2 587,505 including four DC-4s bought at $1,628,400 with current book value of $1,381,238. Current assets of $863. 967 compared with current liabilities of $545,568 Net worth consisted of stock at $21,740 and surplus and partnership equity of $1,106 931

▶ **Company History**—Stanley Weiss and James Fischgrund, partners in North American Air Coach System started Standard Airlines in 1945 buying a DC 3 with the help of a $40 000 Reconstruction Finance Corp. loan (None of the applicants owe RFC any money now all planes are owned outright by the group)

CAB regulations on flight frequency were less defined than today and had never been tested in court But CAB eventually moved against Standard Airlines for flying too frequently The Board suspended Standard's registration But the U S Court of Appeals stayed the CAB suspension order The court ultimately ruled that the Board had illegally suspended the carrier's registration without giving them a hearing

In the ensuing period 1948-49 nonsked business bloomed in the sun of the year long court stay and other court rulings that left CAB without defined powers to suspend nonskeds for flying too often In 1949 the Appeals Court ruled that CAB must give a company a hearing before putting it out of business

Meanwhile American Airlines asked the U S District Court, N Y., for an injunction against Standard's flying too often, in alleged violation of the CAB flight frequency regulation Standard won this case too

But finally CAB revoked Standard's registration in 1949, after proper hearing

Then Weiss and Fischgrund joined up with R Hart and Jack Lewin and set up the nucleus of the present seven company contract organization They organized North American Airlines Agency and Republic Air Coach System and entered into contracts for these two to furnish sales, accounting and ground service for nonsked carriers Such contracts are now in effect with the other five merger applicants plus Standard Airlines (now only an aircraft-owning company) and Hemisphere Airlines an operating nonsked

On July 5, 1950, CAB revoked the registration of Viking Airlines, owned by Lewin and Hart—also for flying too much And on Apr 20, 1951, CAB similarly revoked the registration of Oxnard Sky Freight, a carrier whose sales were handled by the North American Airlines Agency under a contract arrangement

As profits grew Republic and North American's owners bought more planes and expanded sales facilities They formed California Aircraft Co and Twentieth Century Aircraft Co as partnerships to own planes and lease them to the carriers

And that's the setup today None of the present carriers contracted flew too frequently on any one route, as North American interprets the current CAB regulation But if sales of the agency expand further, it's a safe bet that North American Air Coach System will have little trouble signing on an additional carrier (with a CAB letter of registration) to handle the increased business

Japanese Airlines

Japan International World Airways, one of the two Japanese airlines proposing to fly the Pacific by way of Honolulu, is reported planning a fare of $381 from Tokyo to San Francisco, computed to a standard fare of $650 for existing services

Meantime, its Pacific rival, Japan Air Lines has bought two DC-4s from Pan American World Airways, one to arrive in Japan August 27, the other September 27 They will replace two Martin 2-0-2s chartered from Northwest Airlines

Braniff, Mid-Continent Merge

The U S airline map was remade one minute after midnight Aug. 16 when Mid-Continent Airlines legally went out of existence and Braniff Airways took over.

The move more than doubled Braniff's domestic coverage from its own 4,831 unduplicated route miles to 10,234 unduplicated route miles. Braniff in addition operates 7,599 route miles through South America. The carrier now will serve 61 cities in the U S from the Great Lakes to the Gulf and from Denver, Colo., to Memphis, Tenn., and Miami, Fla., and eight Latin American countries as far south as Rio de Janeiro, Brazil and Buenos Aires, Argentina. Principal junctions of the two carriers are Chicago, Houston, Kansas City and Tulsa.

The merger builds Braniff's roster to 58 multi-engine aircraft. Braniff owned nine DC-6s, one Convair 340, eight DC-4s and 13 DC-3s. MCA is contributing five Convair 240s and 21 DC 3s. In addition, Braniff has on order 19 more 340s and MCA had signed contracts for six more 340s.

Braniff recently took delivery of its first 340 and is racing to get it into service Sept. 15, hoping to beat United. MCA's five 240s are scheduled to be sold and replaced by 340s. And Braniff also intends to get rid of a batch of DC-3s, keeping enough to work the shorthaul segments of MCA's former routes.

The new carrier will be called Braniff International Airways. T. E. Braniff remains as president and chairman of the board. Charles E. Beard, Braniff's executive vice president, retains his position under the merger. J. W. Miller, Mid-Continent president since 1942, becomes a vice president and member of the board of the new combine. MCA board chairman Thomas F. Ryan, III, will be a director.

Under the merger, one and one-half shares of MCA common will be exchanged for one share of Braniff stock. Braniff's stockholders have approved increasing the carrier's capital stock from 1.5 million shares to 2 million.

T. E. Braniff founded his airline in 1928, incorporated it in 1930. At the start he flew three round trips daily between Oklahoma City and Tulsa, using a five place single-engine plane, and employed a staff of three. Mid-Continent has expanded in the last 15 years from a seven plane carrier serving nine cities. Ryan acquired possession of the airline in 1936.

CAB Okays New Air Cargo Service

CAB has granted an air cargo certificate to Aerovias Sud Americana, a nonscheduled American carrier serving Latin America from Tampa, Fla. CAB members Oswald Ryan and Chan Gurney dissented. They claimed this certification would allow too much competition. But the President approved the favorable decision of the Board majority—Donald Nyrop, Joseph Adams and Josh Lee.

The Board deferred decision on the fitness of a similar applicant, Skytrain Airways. Skytrain is seeking a cargo certificate to serve another Latin American route from New Orleans. The Board indicated that it would approve Skytrain's application if the company can prove its fitness. CAB will hold another hearing on that question.

The CAB majority cites as precedent for granting an all-cargo certificate the domestic and Puerto Rico air cargo cases of the Flying Tiger Line, Slick Airways and Riddle Aviation.

The majority opinion justifies the newly certificated Latin American all cargo service on four main points:

▪ **Public need.** Air shipment of large items of freight in the Latin American area will help build "present commercial ties" and stimulate "creation of new enterprises," CAB says.

▪ **Competition good.** "We are convinced by the evidence relative to the rivalry (of Skytrain with PanAm, and Aerovias with National Airlines) . . . that the development of airfreight transportation in the Latin American area can be accelerated through the certification of competing services . . ."

▪ **Won't hurt.** Airfreight in Latin America "is still in an embryonic stage so that certification of the applicants herein will not result in diversion of existing clients . . ."

▪ **No subsidy.** Aerovias and Skytrain ask no subsidy.

The CAB examiner had recommended certification of these two services. The Board approval and reasoning is taken by Washington observers as indicating a slightly warmer climate for the Board's future reconsideration of the trans-Atlantic airfreight applications of Seaboard & Western, Transocean and European-American. However, it was a 3-2 split decision, and the opinion represented a specific and fairly narrow case rather than a broad policy decision.

Aerovias is authorized to serve Tampa-St. Petersburg, Havana, Merida, Mex., Belize, Br. Honduras, Guatemala City, San Salvador, Balboa, and Bogota, Columbia. As the Board majority points out: "The only points between which competitive service between Aerovias and Pan American will occur is with respect to service to Havana, Cuba, and Balboa, C. Z., and this assumes that Miami and St. Petersburg-Tampa are competitive U.S. terminals."

Sperry Autopilots Disconnected by AA

American Airlines has disconnected its Sperry A-12 autopilots as a result of a failure July 17 in a DC-6, flying near Nashville. The plane went into a sudden 20-deg. dive and two passengers were slightly injured.

The recently disclosed incident followed another AA autopilot failure on a DC-6B in June which did not result in passenger injury.

American also has temporarily shelved plans to commission the remainder of its A-12s on a DC-6 fleetwide basis. However, an AA spokesman says the program probably would have been delayed for economic reasons even without the recent Nashville incident. American's A-12s are now several years old and AA wanted to modernize and recondition them before putting them into use. This would have involved a sizable financial outlay, an AA spokesman says.

▶ **Cutoff Device**—Surprisingly enough the DC-6 was equipped with a newly developed cutoff device designed automatically to disengage the autopilot in the event of malfunction. The device functioned, but much too slowly, allowing the plane to nose down 20 deg. before disengaging the autopilot. AA says the sluggishness was caused by an unusual combination of faults. One was a tube failure in the autopilot, the other was a change of characteristics in the amplifier of the cutoff device.

The DC-6B autopilot which failed was not equipped with the automatic cutoff. However, its servo actuator forces were limited to prevent the autopilot from overstressing the plane in the event of malfunction.

UAL Orders Two Simulator Types

United Air Lines has signed a contract with Curtiss-Wright Electronics division for two Douglas DC-6 and two Convair 340 simulators costing more than $3 million.

Announcement of the order followed by only a few weeks word that joint specifications for the electronic "airliners" had been laid down during discussions by UAL and C-W (AVIATION WEEK July 21, p. 81). It came only a few months after President Truman's Airport Commission, headed by James H. Doolittle, recommended that civil aeronautics authorities require the carriers to buy flight simulators to train pilots in emergency procedures.

According to a Curtiss-Wright spokesman, UAL will take delivery on its simulators "early in 1954," and he expressed the belief that other carriers soon will get on the bandwagon being vigorously pushed by C-W and Link Aviation, Inc.

United simulator order is the largest ever placed by a commercial airline and the first by a domestic airline. It's also the first U.S. order since Pan American bought a Stratocruiser version in 1948.

The DC-6 simulator will be applicable for DC-7 training (United has 25 DC-7s on order) without much difficulty.

▶ **Two-to Base**—UAL will base one DC-6 and one Convair simulator at Chicago and one of each at Denver. Early reports were that UAL would train its crews exclusively—unlike PAA which has also trained BOAC and MATS personnel.

With over 1,000 pilots and co-pilots on its roster and more being added, the carrier will be able to keep the simulators busy on a program of standardizing flight procedures and habits and training to cope with emergencies. D. R. Petty, UAL vice president-flight operations, said the trainers will permit substantial economies by enabling pilots to get much of their "flight" time on the ground rather than in actual aircraft and in reducing the need for withdrawal of precious planes from scheduled service for training purposes.

Big Mexican Line Seen in Offing

(McGraw-Hill World News)

Mexico City—A group of Mexican businessmen and politicians reportedly is buying up several Mexican airlines in an effort to form the biggest commercial airline in the country.

United Air Lines' Mexican affiliate Lamsa, recently was purchased by a group that included the owner of Aeronaves de Mexico, which flies the Acapulco route (AVIATION WEEK Aug. 11, p. 49).

It is believed the same group is negotiating to buy, or already has bought, Aerovias Reforma.

Reports also link this group to a new company, Aeromex, which has applied for the reciprocal right to fly to New Orleans under the recent concession granted Eastern Air Lines to fly the New Orleans-Mexico City route.

This combination, possibly including another Mexican airline now flying to Miami, would give Mexico a strong airline equipped to fly both domestic and foreign routes and entirely controlled by Mexican capital.

It might secure several international routes in return for rights recently granted by Mexico to Air France and KLM. In addition, discussion of routes with BOAC now is underway.

Pan American's Mexican affiliate Compania Mexicana de Aviacion, which for years has dominated Mexico's commercial aviation, would be hardest hit by the new carrier if it were to be formed.

BEA TESTS LONDON HELIPORT SITE

British European Airways' Sikorsky S-51 landing at London's South Bank, in the shadow of nearby Houses of Parliament and scene last year of Festival of Britain. The site is being considered as a stop in BEA's scheduled intercity copter service, slated to begin in about two years. BEA is running a two week trial in this area using the S-51 and a Bristol 171 and is also measuring the noise effects of the operation.

SHORTLINES

▶ **Air Coach Transport Assn.** signed its second annual contract with Defense Department to bid for nonsked members on official military moves. ACTA has set up an agency relationship division to wage its perpetual war against unethical practices of certain independent agencies "for which our carrier members are not responsible but for which they are continually maligned," ACTA states.

▶ **Air Transport Assn.** will not pick a successor to present President Emory S. Land for some months, a spokesman says. Braniff President Tom Braniff heads the selection committee. Land is expected to retire at year's end.

▶ **California Central Airlines** reports passenger traffic Jan. 1-July 6 up 55% over a year ago to 98,375 passengers.

▶ **Central Airlines** has been recommended for a five-year certificate renewal plus some route extensions by CAB Examiner Herbert Bryan.

▶ **Chicago & Southern Air Lines** will start a "new type" flight dispatching system this fall, cutting the average dispatch message from 16 to six teletype lines.

▶ **British European Airways** is scheduled to get its first turboprop-powered Vickers Viscount Oct. 1 and plans to have it in scheduled service in March, 1953. The carrier will also replace most of its biplane DH Rapides in service in Scotland with Pionairs (C-47).

▶ **Capital Airlines** has confirmed that merger negotiations with United Air Lines have ended. UAL President W. A. Patterson said they had broken off last month.

▶ **Helicopter Air Lines** is a company formed to apply to CAB for copter service in the area around Seattle.

▶ **National Airlines** DC-4 Pilot S. W. Wilson made a successful landing at Norfolk after the nose wheel failed to lower because the internal steering pin had broken allowing the wheel to turn inside the housing.

▶ **Northwest Airlines** July load factor of 68% compares with 77% a year ago. Load the first six days of August was 69%. . . . June revenue of $4,245,118 topped all NWA records and was 10% over a year ago and 22% over

this May-June revenue passenger miles were 72,528,000.

▶ **Pan American World Airways** now has 11 of 39 Super DC-6s it ordered. PanAm's souped-up DC-6s are the first U. S. airliners ever built as air-coaches from the start. President Juan Trippe has told directors the company is pressing CAB to end the delay in fixing final mail rates for the Atlantic and Latin American divisions.

▶ **Post Office Department** asks CAB permission to send mail by nonsked airlines. "The department should be in a position to request ... when the volume of mail warrants, that the CAB issue an exemption order" authorizing nonsked carriage of mail on a contract basis, Assistant Postmaster General John Redding says.

▶ **Robinson Airlines** is changing its name to Mohawk Airlines. The local service line operates mostly through upstate New York.

▶ **Scandinavian Airlines** DC-6B is slated to fly from California to Norway over the North Pole route. Time saving is estimated at 11 hours under the normal transcontinental trans-Atlantic route.

▶ **Seaboard & Western Airlines** reports 16,666,502 revenue ton miles hauled the first half of this year, up 5% from a year ago.

▶ **Swissair** carried 136,827 passengers the first half of this year, up 13% from a year ago.

▶ **Trans World Airlines** plans a $15 million new overhaul base at Fairfax Airport, now that Kansas City has voted a $20-million revenue bond issue to improve facilities there. The bond issue is to be paid off by revenues from these facilities. An additional $3 million city bond was voted to enlarge the airport.

▶ **United Air Lines** plans to introduce daily 66-passenger DC-4 aircoach service Seattle-Portland-Chicago Sept. 28. Company's 235,474,000 revenue passenger miles in July were 36% over a year ago, and off 2% from June's all-time record. Mail at 1,694,000 ton miles was up 17%, express 702,000 ton miles up 1% and freight 2,207,000 ton miles, up 41%. CAB show-cause order proposes the same 45-cent a ton mile mail rate for company's overseas service as it receives for domestic carriage.

▶ **Wien Alaska Airlines** would get $1,047,384 annual mail pay from last Jan. 1 if CAB finalizes its rate proposal for the carrier. About $797,000 of this would be direct subsidy, CAB estimates.

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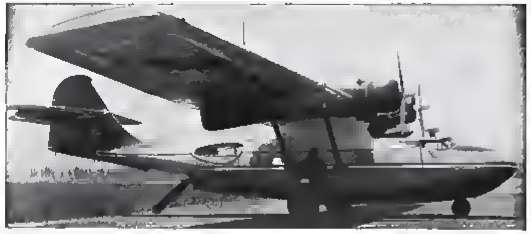

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407	SF4LN-2 (manufacturer' part No. 10–53453–6 Spec. AN951F)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10–36170–1)	Bendix Scintilla Magneto
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75	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76836	Gear
1178	84589	Bearing
113	84487	Housing
27	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
200	86065	Cylinder

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45	AN4103-8	Clifford	Brass (Valve #U4785) Oil Cooler
38	18597-2	Airesearch	Aluminum Oil Cooler
120	MFG-713-15A	Vickers	Hydraulic Pump
550	TFD 6600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
250	AN4014	Eric Meter	Wobble (D-3) Pump
300	HB40A-R & KA	Pesco	Hydraulic Pump
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
600	AN5780-2	Weston	Wheel & Flap Position Indicator
44	5BEA35D148	G. E.	DC Motor (½ HP)
50	BD88880	Holtzer Cabot	DC Motor
115	P4CA2A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32226)	Nema	Ignition Switch
687	RS-2	Mallory	Selector Box
90	JH950-R	Jack & Heinz	Starter Motor
498	S-841 (94-32253)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 18"–1600 P.S.I
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-3334	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Separator
100	716-3A	Eclipse	Generator (NEA 3A)
37	117-47	Edison	Detector
80	318	Edwards	Horn
20	7944-F	Stewart-Warner	Heater
230	921-B	Stewart-Warner	Heater (800000 BTU)
85	12924-2	Adel	Lock Valve
80	DW22	Eclipse	Transformer
97	6041H 146A	Cutler-Hammer	Relay (8–12)
92	0655-D	Aro	Oxygen Regulator
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SO THEY TELL US

Military

It looks as though Bill Bridgeman will be named test pilot for the X-3

Screaming banner headlines in the newspapers July 15 reported that the Douglas Skyrocket had gone 1,300 miles an hour. Look back to AVIATION WEEK of July 16, 1951, p. 14 (a year earlier), which says: "Informed quarters at the Pentagon speculated that the plane had approximated Mach 2 at an altitude of 72,000 feet. Mach 2 at that height would be about 1,324 mph."

When civilian ground observers went on 24-hour duty recently, they were alerted to watch for "flying saucers," in addition to their other duties.

Industry

North American's F-86D and not the Lockheed F-94C may be the first interceptor actually operating with an automatic avionics intercept system, an Air Defense Command spokesman tells us. Lockheed reportedly is just beginning flight tests of the F-94C's Westinghouse autopilot, which must precede complete system tests. North American has nearly completed flight tests on the Lear F-5 autopilot.

Northrop's production line is now switching over to the F-89D, and deliveries will begin shortly.

CAA

CAA has discontinued its monthly CAA Journal, blaming "drastic curtailment of operating funds." It will furnish former subscribers with a mimeographed sheet at intervals.

Rumors fly from coast to coast that the director and deputy director of the Office of Aviation Safety, E. S. Hensley and William B. Davis, are washed up in these positions, but they will stay on the job until—it is hoped—criticism cools off. Davis, who was threatening to sue AVIATION WEEK, has not done so. It now appears pretty well established that the expensive and complicated "reorganization" of OAS was a maneuver designed primarily to remove William S. Moore and W. W. McConnell, two officials generally recognized in aviation as independent and capable, from positions where they were constant threats to the future of Hensley and Davis. Moore was shanghaied to Fort Worth at reduced salary, and McConnell was yanked out of the first region where he was respected by airlines and others, and given the choice of a minor post in Kansas City or Chicago. He chose Denver and made it stick. Both Moore and McConnell are being remembered well by some CAA people who still have hopes of seeing capable men in CAA top safety posts.

Transport

Round robin letters to all U. S. airline presidents have been sent by Safe Flight Instrument Corp., offering to put a free stall warning-speed control installation on any of their transports, for tests. They feel this comparatively recent speed control development would prevent some over-shooting. There's been little response. Meanwhile, Bob Moss of ALPA has flight-tested the system in a Bonanza, and recommends that ALPA try to get pilot locals interested.

When we asked one nonsked official for comment on the fact that some nonskeds have lists of violations on their CAA records, he said, "Some violations CAA slaps on us are fair and justified. But a lot are trivial or unjustified. What isn't publicized is that some scheduled airlines have as many violations on their record as some of us."

Delays in much-needed CAA airport surveillance radar (ASR) and precision approach radar (PAR) installations are due largely to overly rigid CAA requirements and earlier CAA officials who insisted on meeting every letter of the specs. CAA, it's said, was unwilling to accept radar techniques which the military found ok. Result is that radar installations are delayed.

Press

American Aviation magazine has engaged the law firm of Pogue & Neal in its feud with a writer on the New York Enquirer, a Sunday newspaper, for what it contends are derogatory remarks about the magazine and its policies.

Skyways magazine, despite the death last week of J. Fred Henry, its publisher, expects to switch to the executive aircraft field with its October issue.

STRICTLY PERSONAL

Blame This on United Publicity

United Air Lines publicity writers say an airline stewardess brought back these excerpts from instructions printed in English for motorists in Tokyo:

1. At the rise of the hand, policeman' Stop rapidly.

2. When a passenger of the foot heave in sight, tootle the horn. Trumpet at him. Melodiously at first, but if he still obstacles your passage, tootle him with vigor. Express by word of mouth the warning, "Hi! Hi!"

3. Beware the wandering horse that he shall not take fright. Do not explode the exhaust box at him as you pass. Go soothingly by.

* * *

Who's Zoo?

Avro Canada's board chairman got comfusingly zoological in a speech on Canadian aviation the other day. "The British lion,' Sir Roy Dobson said, "is far from decrepit. She has wings now and what is more, is jet-propelled. More important, she has beside her the Canadian Beaver and the American Eagle, as well as other well behaved animals. It would be a very foolish bear, indeed, even if he were joined by a dragon, which would dare arouse us."

* * *

Today's Dispatch from Korea

Strictly Personal's most recent correspondent in Korea, George Christian, reports this reassuring sign at FEAF Headquarters in Seoul:

"Don't Worry, Bud, They Can't Send YOU to Korea."

* * *

He's Glad the Link Wasn't Missing

Our own Phil Klass came back from Binghamton the other day boasting about being one of the few men who ever crashed a B-47 on landing and walked away without a bruise. Thanks to Link's B-47 simulator.

* * *

Noted on a UAL Memo

A little sketch urges the passenger to tuck his napkin in his collar, even as our grounded grandfathers used to do, and there's this couplet:

'La serviette au cou—it may prevent a spot or two."

—George Christian

* * *

But Is There A Commodity Rate for It?

A United Air Lines publicity blurb the other day reports a new kind of airlift. Quote:

"Air cargo agents for United at Washington were curious about packages arriving from Seattle marked 'Breath.' Investigation revealed that the packages contained real human exhalations. Packed in individual metal containers were samples of breath of Navy workers subjected to radioactive materials. As a safety precaution, the government makes routine checks of the breath of such personnel."

—RHW

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—AUGUST 18, 1952

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hiltz, Mgr.

EDITORIAL

The Phoney War

The Korean debacle continues to resemble a phoney war. Men are still being maimed and killed because our military leaders are not permitted the freedom and flexibility to wage aggressive, intensive modern warfare.

The British raise a hue and cry because important powerplants within Korean boundaries are bombed months and months after we start military action against the North Koreans.

To answer the British, we apologize and go to disgusting lengths to justify our action. The average American, familiar with our lengthening casualty lists, asks indignantly why these powerplants—which have operated continuously—were not bombed months and months ago?

Now, the Air Force drops leaflets all over North Korea warning civilian inhabitants of 78 towns and cities to flee before our newly scheduled bombings. The attacks are contemplated, Air Force Secretary Finletter says, because these centers have become concentrations for military equipment, supplies and troops.

The Communists, says the Secretary, "have had the practice ever since the war has been going on of moving materials and supplies into densely populated areas." He adds that the United Nations, in self-defense, are forced to do everything possible to destroy this Red buildup.

We have been reading about this Red buildup since the days of MacArthur. Why have we permitted hundreds upon hundreds of our men to die without taking this action sooner, if it is officially admitted that this strengthening has been underway "ever since the war began?"

What other "imperative" actions will we announce in six months—which we should be getting started now?

Our Air Force, Navy and Army have been captives of politics, in a war they have not been permitted to fight. It is a phoney war. But there is nothing phoney about the recent United States casualty list of 114,310 dead, wounded and missing.

Horne's 'Appropriate Steps'

The taxpayers have a right to expect a federal official to serve his country by performing his prescribed duties.

They expect the Administrator of Civil Aeronautics to administer aviation.

Being taxpayers in a free country, they expect to criticize their public servants conscientiously, and they expect the press to meet its obligations by doing likewise, when necessary.

No public official in the United States has any right to feel that he is above criticism.

Yet, one officer of an aviation organization that has been critical of the present Civil Aeronautics Administrator and his policies reports an enlightening conversation with the Administrator.

Admiral C. F. Horne made the point that the group had been "picking on" him and his agency, and that if they were not careful they would end up by getting the same treatment as AVIATION WEEK is getting—namely, so the Admiral's story went, critical and extreme pressure has been put on the editor, large quantities of advertising have been canceled because of the editor's "picking on" CAA, and great indignation has been evidenced throughout the industry because of AVIATION WEEK's editorial campaign on CAA. And, the Admiral added darkly, there is more to come!

This is rather petty stuff but if this kind of thing has been going on under the direction of the Administrator of Civil Aeronautics, it should be made known to more individuals that the Admiral may have been able to contact. Our circulation is over 40,000 now.

It seems apparent now what the Admiral must have meant in a memorandum he wrote Mar. 19 to his regional administrators and published on this page Apr. 14. He then wrote: "Other appropriate steps have been taken and will be taken, to counteract the effects of these one sided editorials."

Appropriate, Admiral? And at the time, we asked the Admiral why he was more interested in "counteracting" effects than in removing causes.

This is as good a time as any to make clear once again that AVIATION WEEK expects to continue saying editorially what it believes. The history of American journalism in general and AVIATION WEEK in particular indicates that no other kind of publication can win the loyalty of its subscribers—or advertisers.

(The Bodness Department of Aviation Week says the Aug. 4 issue was the largest issue in our history with more than 500 pages of advertising. Aviation Week ran about 1,515 pages of display advertising in the first seven months this year. It gained about 367 pages of advertising over the first seven months of 1951 while the second largest aviation magazine ran a TOTAL of approximately 600 pages of ads in the first seven months of 1952.)

Confused Public Relations

The top public relations officer of one of the military services is an ex-intelligence operative. The job of a public relations officer is to tell the taxpayers as much as humanly possible about the way their taxes are being spent, or burst a button trying. The prime obligation of an intelligence officer is to tell as little as possible, every thing is secret.

This confusion in basic public relations philosophy, noticed in the agency's high command, explains why its press relations are troublesome.

When, oh when, will our government agencies appoint chief public relations officers who know their business?

A Woman Scorned—

Incredible as it seems, we Americans are displaying little interest in a national airmarking campaign. If any citizen of the world should know the value of "road signs" it's an American.

Yet that energetic and photogenic society of women flyers, the 99's, finds leaders of the average community difficult to awaken to the need to paint the name of their town where overflying pilots can read it!

If this discouraging tide of opinion can be turned by anyone, it's the ladies. Never, we advise the townsfolk, underestimate the power of a woman. Our bets are on them to dissolve the opposition to airmarking.

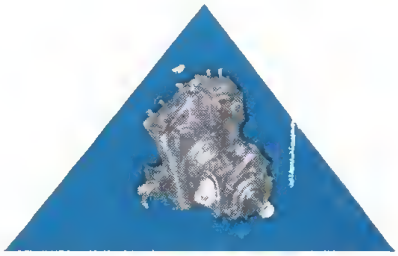
—Robert H. Wood

Transmissions on Piasecki Helicopters Manufactured by Foote Bros.

PIASECKI HRP-2

PIASECKI H-21

PIASECKI HUP



Flying fram Navy ships, Piasecki Helicopters are performing such vital missians as rescuing dawned pilots and develaping anti-submarine warfare techniques. U. S. Marines used them ta evalve airbarne assault tactics. Now the giant Piasecki H-21 Warkharse apens up new possibilities with its langer range and higher laad capacity.

Foate Bros. Manufactures transmissions for all Piasecki Helicopters.

Drives, transmissians and mechanical units engineered and manufactured by Faate Bros. are also used an many af the natian's leading aircraft and aircraft engines.

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